

2019

# Going From Collaboration + CAE to True Collaborative CAE

Cloud / Web and VR as enabling technologies

CLOUD WEB VR

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CEETRON AS



# CAE Collaboration today

## — MANY USE CASES

- . Local / remote
- . Synchronous / asynchronous
- . Direct visualization / extracted data

## — COMMON FEATURES

- . Data source : CAE result database
- . Shared data: display model, documents, ..
- . Sharing device : screen / file repository / database
- . Communication media: voice, Webex/Skype/... , phone
- . Common interaction on same data

# CLOUD WEB VR

# CAE Collaboration today

## — IN THE OFFICE, INSPECTING A MODEL

- . Local
- . Synchronous
- . Direct visualization of display model

### SOURCE

CAE  
Results

### SHARED DATA

Display Model

### SHARING DEVICE

Screen

### COMMUNICATION MEDIA

Voice

# CLOUD WEB VR



# CAE Collaboration today

## — REMOTE MEETING WORKING ON A REPORT

- . Remote
- . Synchronous
- . Extracted data

### SOURCE

CAE  
Results

### SHARED DATA

Powerpoint

### SHARING DEVICE

Screen

### COMMUNICATION MEDIA

Conferencing  
Application

# CLOUD WEB VR

# Improved CAE Collaboration

## — REMOTE OFFICE-LIKE COLLABORATION, LOOKING AT A MODEL

- . Remote
- . Synchronous
- . Direct visualization of display model

### SOURCE

CAE  
Results

### SHARED DATA

Display Model

### SHARING DEVICE

Screen

### COMMUNICATION MEDIA

Voice

# CLOUDWEB VR

# Improved CAE Collaboration

## — SHARED PHYSICAL ENVIRONMENT, LOOKING AT A MODEL

- . Remote
- . Synchronous
- . Direct visualization of display model

### SOURCE

CAE  
Results

### SHARED DATA

Display Model

### SHARING DEVICE

VR headsets

### COMMUNICATION MEDIA

Voice

# CLOUDWEB VR

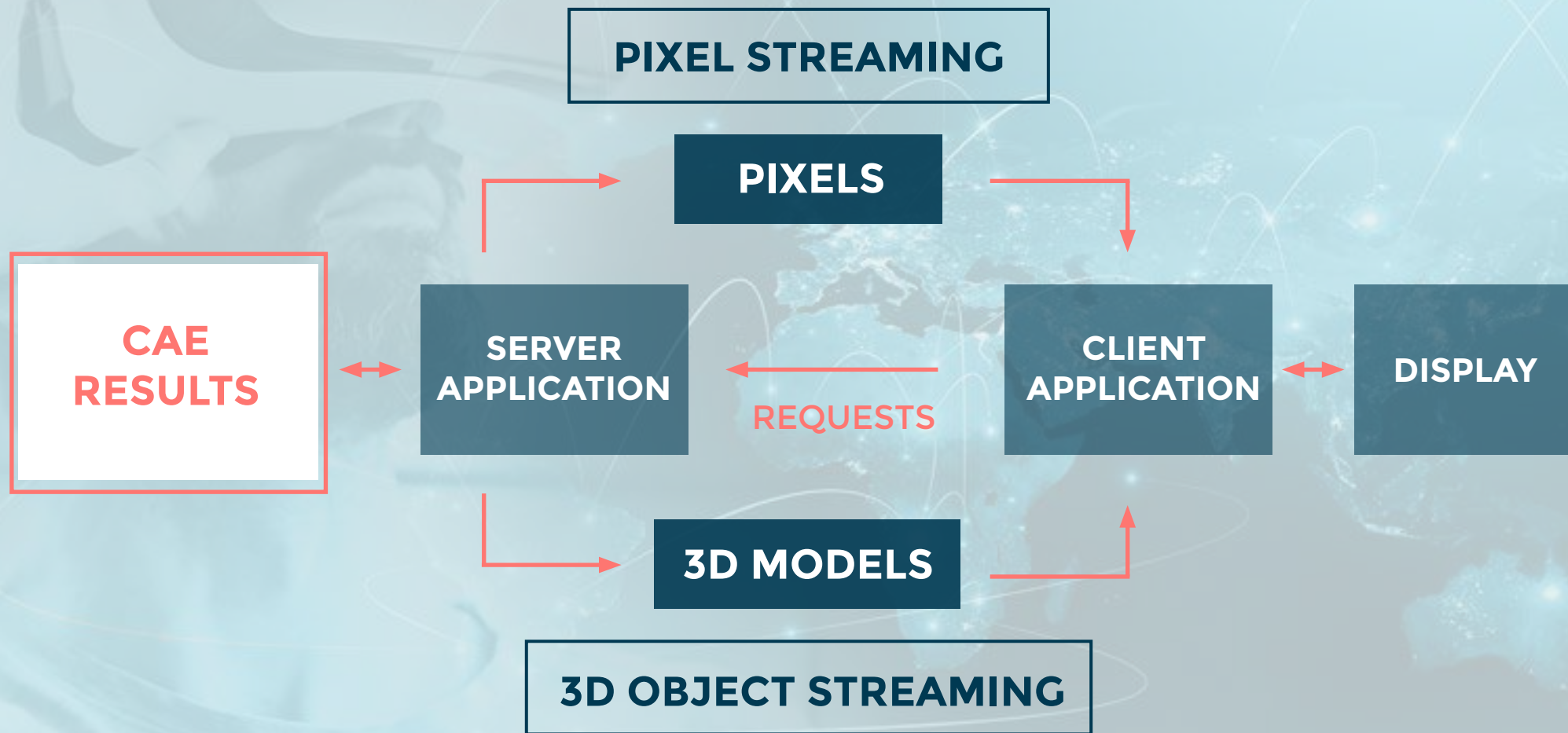


# Outline

- **CLOUD-BASED VISUALIZATION TECHNOLOGIES**
- **VIRTUAL REALITY IN THE CAE SPACE**
- **MIXING IT ALL TOGETHER : A REAL-LIFE APPLICATION**
- **FUTURE WORK**

# CLOUDWEB VR

# Cloud-based visualization



# CLOUD WEB VR



# Cloud-based visualization

## — PIXEL STREAMING

- . Model size independent
- . Lag, UX discomfort
- . Limited graphic quality
- . High server cost

## — 3D OBJECT STREAMING

- . Model size dependent
- . Desktop-like UX
- . HQ graphics
- . Reduced server co

# CLOUD WEB VR

# Cloud-based visualization

## — APPLICATIONS

- . Ceetron Cloud private/public 3D model sharing portal
- . Ceetron Analyzer (Cloud) full-featured postprocessor
- . Vcollab Web Viewer (Demo) viewer

## — DEVELOPMENT TOOLKITS

- . Paraview Web
- . Ceetron Cloud Components

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# Cloud-based collaboration

## — 3D DISPLAY MODEL SHARING

- . Cloud-based portal/repository
  - ▶ “Public” or private cloud
  - ▶ On-premises or not
- . Upload 3D models
  - ▶ Interactively from desktop post-processor
  - ▶ Automatically from script
- . Share model URL (like Dropbox)

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# Cloud-based collaboration

## — COLLABORATION WORK IN PROGRESS

- . Invite participants
- . Presenter takes lead : model interaction
- . Participants
  - ▶ Free navigation or follow the presenter
  - ▶ Add shared personal annotations (text, measurements, ...)
  - ▶ Comments - recorded and attached to the model

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# VR in the CAE Space

## — TECHNOLOGY EXISTS

- . Headsets : Oculus Rift, HTC Vive, Samsung Gear

## — APPLICATIONS

- . Design space

  - ▶ ESI IC. IDO

- . CAE

  - ▶ Ceetron Viewer for Oculus Rift

# CLOUDWEB VR

# VR Cloud-Based Collaboration

## A use case for ship design reviews

### — JOINT PROJECT DNV GL / CEETRON 2018

. Design stage of ships

- ▶ Multiple prototypes
- ▶ Large number of simulations
- ▶ Large number of stakeholders

HQ COLLABORATION NEEDS

# CLOUDWEB VR



# VR Cloud-Based Collaboration

## A use case for ship design reviews

### — JOINT PROJECT DNV GL / CEETRON 2018

- . Design stage of ships
  - ▶ Multiple prototypes
  - ▶ Large number of simulations
  - ▶ Large number of stakeholders

**HIGH DEMAND FOR REMOTE SHARING & COLLABORATION**

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# VR Cloud-Based Collaboration

## A use case for ship design reviews

### — PRESENTER CALLS FOR MEETING

- . Model is opened from cloud-based sharing portal

### — PARTICIPANTS JOIN IN COMMON VR SPACE FROM REMOTE LOCATIONS

- . Represented by avatars
- . Can walk around in the ship model
- . Can communicate by speech

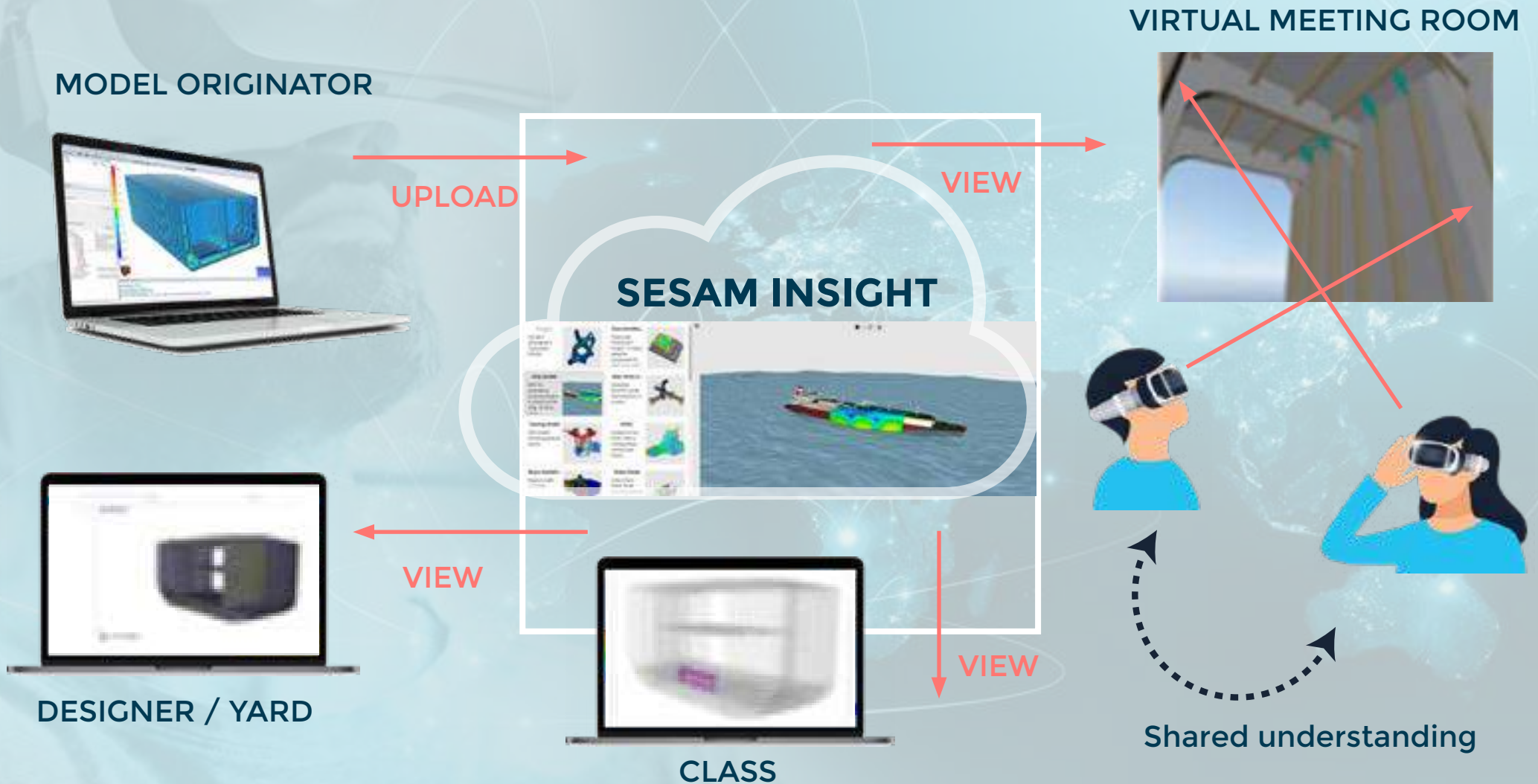
### — INTERACTION

- . VR controllers
- . Speech recognition

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# VR Cloud-Based Collaboration

## A use case for ship design reviews



# CLOUDWEB VR



# Future work

## — COLLABORATION

- . Work in progress to finalize. Call for interested participants
- . Deploy solution with or without VR

## — FROM VR TO AR

- . Microsoft Hololens 2 : high expectations
- . Adapt viewer to new technology

## — EXPAND SCOPE

- . From CAE to medical applications

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# Thank you !

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understanding by visualization