

Alternative Reality : Virtual, Augmented, Mixed...

PIX-FACTORY

IFREMER, Brest –
31/05/2018



Few definitions



Few definitions

And
preamble...



Few definitions

Virtual Reality (VR) – Immersion in a computer generated environment+ interactivity



Few definitions

Virtual Reality (VR) – Immersion in a computer generated environment+ interactivity

Augmented Reality (AR) – 2D or 3D informations added to the real environment



Few definitions

Virtual Reality (VR) – Immersion in a computer generated environment+ interactivity

Augmented Reality (AR) – 2D or 3D informations added to the real environment

Mixed Reality (MR) – 2D or 3D informations added to the real environment + interactivity



Few definitions

Virtual Reality (VR) – Immersion in a computer generated environment+ interactivity

Augmented Reality (AR) – 2D or 3D informations added to the real environment

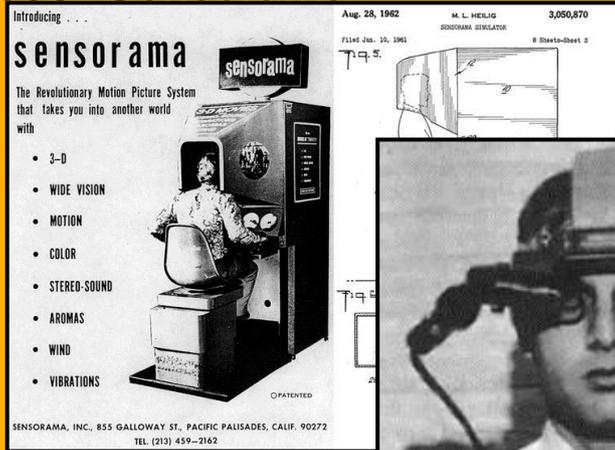
Mixed Reality (MR) – 2D or 3D informations added to the real environment + interactivity

360° videos- Visualization of a real or computerized 360° video (passive role)

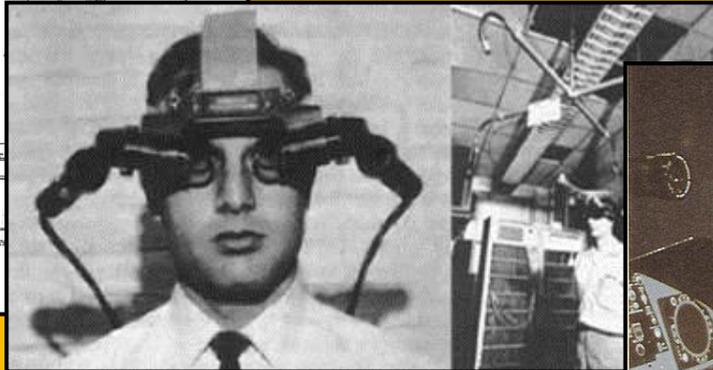


A bit of history...

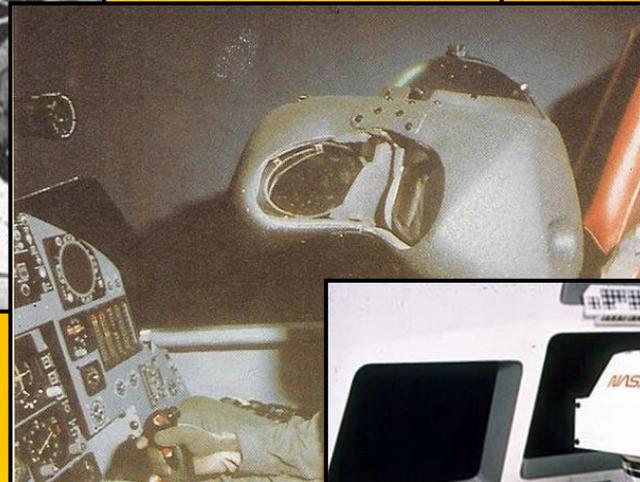
1955- Sensorama



1968- *Damocles Sword*



1970- Super Cockpit



1984- NASA Vivid



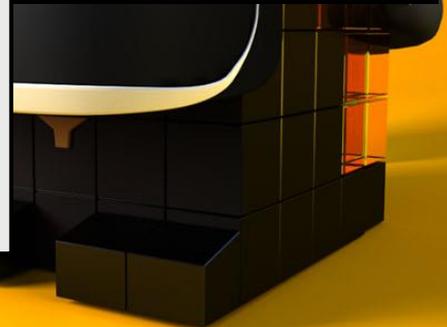
2016- HTC Vive & Oculus Rift



1995- NINTENDO Virtual Boy



1993- SEGA



A bit of technic...

The image

Equirectangular panorama

Monoscopic
or
stereoscopic
?



Monoscopic

Stereoscopic
LR



Area
viewed

A bit of technic...

The image

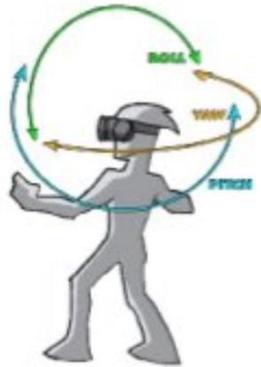
- Resolution : 4k or 8k (4k = 3840x2160 px / 7680x2160 px for stereoscopy)
- Field of view (FoW) : 95° to 110°
- 30 f/s minimum. Optimum at 60 f/s
- Frequence : 90 to 120 Hz



A bit of technic...

Degrees of freedom

3 degrees of freedom (3-DoF)



- "In which direction am I looking"
- Detect rotational head movement
- Look around the virtual world from a fixed point



A bit of technic...

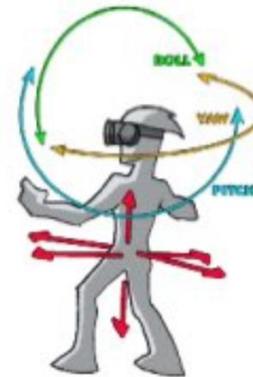
Degrees of freedom

3 degrees of freedom (3-DoF)

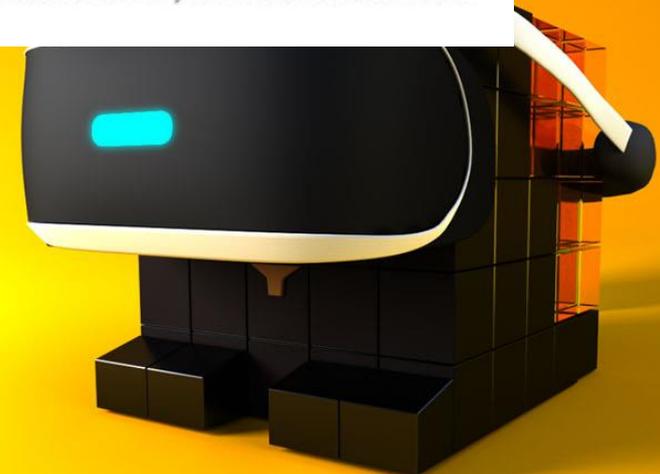


- "In which direction am I looking"
- Detect rotational head movement
- Look around the virtual world from a fixed point

6 degrees of freedom (6-DoF)



- "Where am I and in which direction am I looking"
- Detect rotational movement and translational movement
- Move in the virtual world like you move in the real world



A bit of technic...

Tracki
ng



Mobile VR- 3
DoF



A bit of technic...

Tracki
ng



Mobile VR- 3
DoF



Room scale- Outside In – 6
DoF



A bit of technic...

Tracking



Mobile VR- 3
DoF



Room scale- Outside In – 6
DoF



World scale- Inside Out - -
DoF



A bit of technic...

Tracking
(multi-users
external systems)



The hardware...

2D screen (computer, phone,
ipad...)

<https://youtu.be/VLqA1L2K86c>



The hardware... (VR)

MOBILE HEADSETS (Samsung Gear, Oculus Go, Google Daydream, Google Cardboard)



- + Light, mobile
- + No cables
- 3 DoF
- Low resolution
- Phone processor
- Cost of the phone



The hardware... (VR)

1st Generation Headset (HTC Vive, Oculus Rift)



- + Powerfull processor
- + Highest resolutions
- + 6 DoF
- Cables
- Cost of Headset+Computer
- Complex calibration (OUT-IN)



The hardware... (VR)

2nd Generation Headset (Windows Mixed Reality serie)



- + Powerfull processor
- + High resolutions
- + 6 DoF
- + Easy calibration (IN-OUT)
- + Large movement surface
- Cables
- Cost of the computer



The hardware... (AR)



The hardware... (AR)

- Google Glass (1500 €)



The hardware... (AR)

- **Google Glass** (1500 €)



- **Microsoft HoloLens** (3300 €)



The hardware... (AR)

- Google Glass (1500 €)



- Microsoft Hololens (3300 €)



- Magic Leap
(1500 €)



The hardware... (AR)

- Google Glass (1500 €)



- Microsoft Hololens (3300 €)



- Magic Leap
(1500 €)



- Daqri (10000 €)
Smart Helmet



The hardware... (360° videos)

- Kodak Pixpro 4KVR360

(450 €)

- 1x 235° camera
- 1x 197° camera
- 3 840 x 1 920 px
- 30 to 60 f/s



- Insta360 Pro 8k (3500 €)



- 6x 200° cameras
- Stereoscopic capture available
- 4k for streaming
- 100 f/s max.

- Samsung 360 Round (10000 €)

- 17 cameras
- Stereoscopic capture available
- 4k for recording and streaming
- 30 f/s max.



Applications

Entertainment

Gami



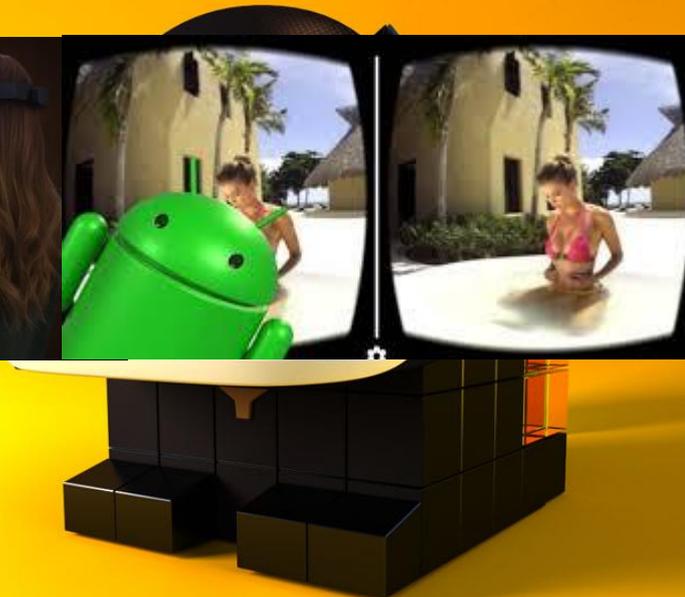
Applications

Entertainment

Gami

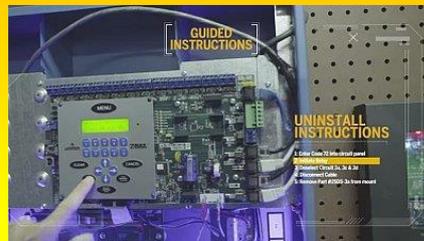


Consumer application



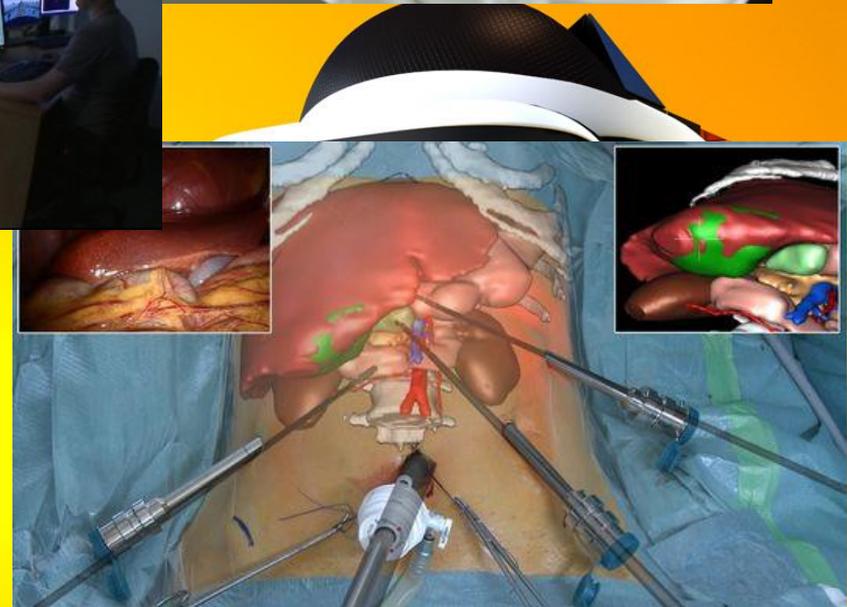
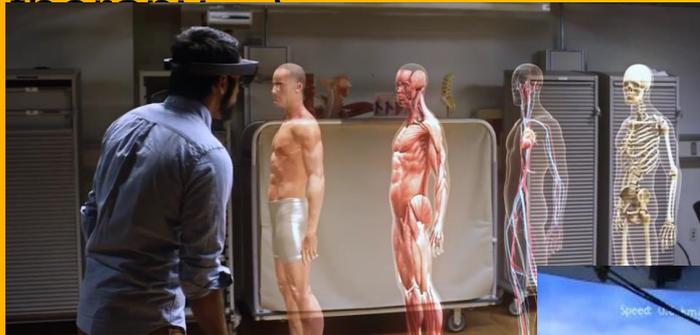
Applications *Professional field*

Industry (training,
conception...)



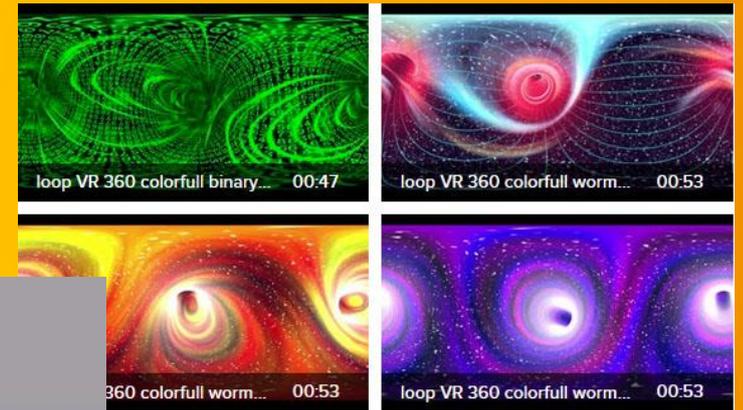
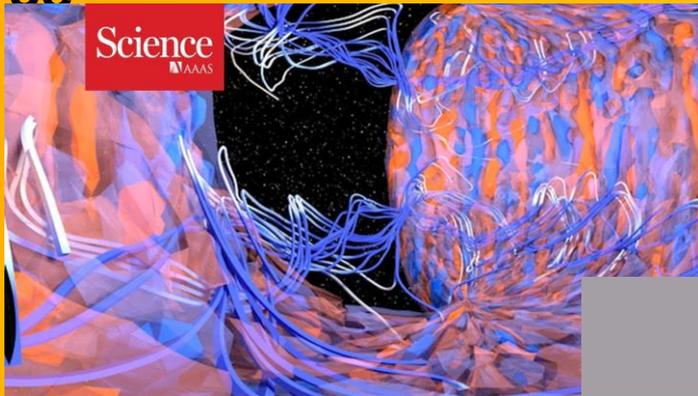
Applications *Professional* *field*

Medecine (training, intervention,



Applications *Professional field*

Scien
ce



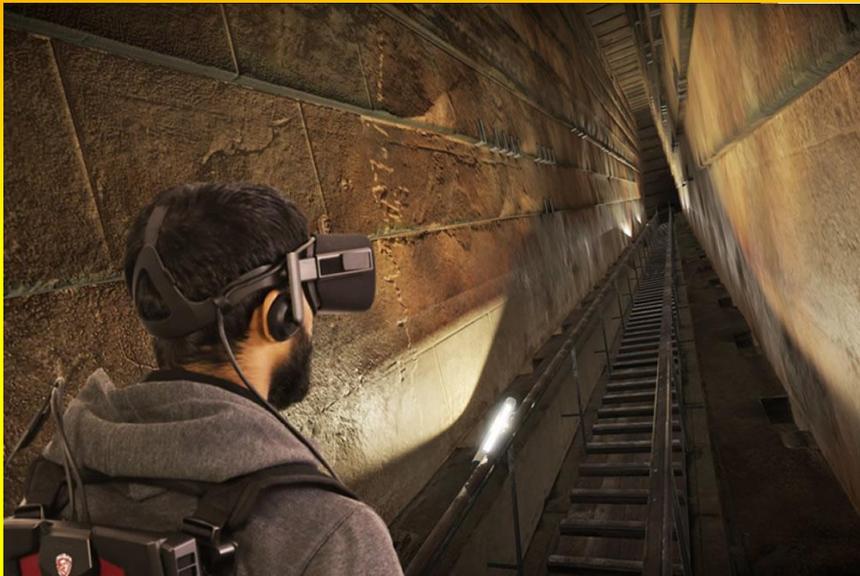
Applications *Professional* *field*

Architecture and town planning (conception, promotion)



Applications *Professional* *field*

Educatio
n



Applications *Professional* *field*

Tourism (virtual tour, historic reconstitution, information)



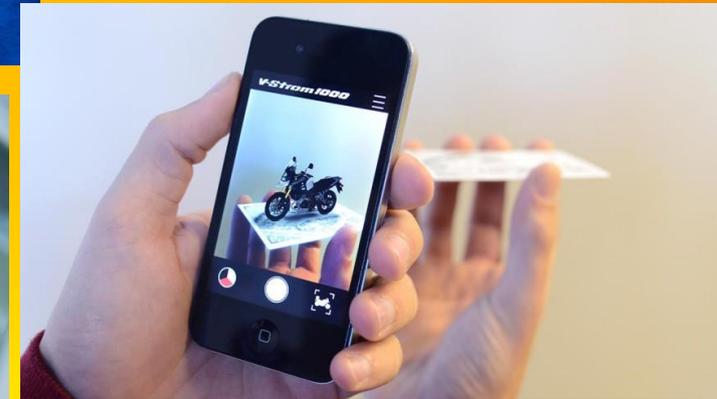
Applications *Professional* *field*

Military (recruiting, formation, strategic uses)



Applications *Professional* *field*

Publicity and marketing (promotionnal video, online selling, customer experience...)



Applications *Professional* *field*

Cinema, journalism and sport (fiction, documentary, live streaming, immersion)



Veja o jogo FC Porto x SL Benfica em realidade virtual
Uma experiência envolvente como se estivesse no estádio



Experimente nas lojas Samsung a partir das 19h do dia 20 de setembro
[Ver lojas](#)

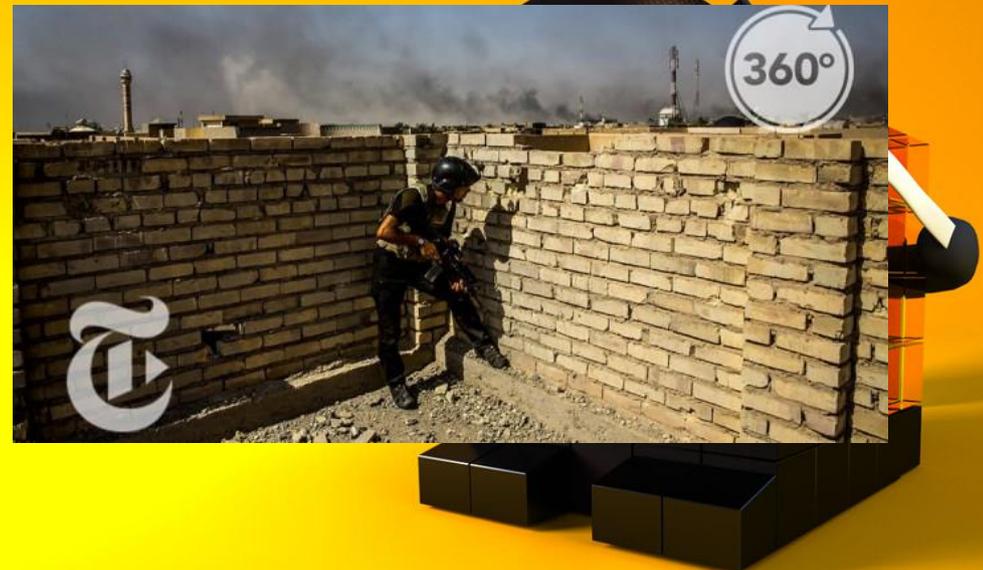
Já tem o Gear VR?

- 1 Acesse a Loja Oculus
- 2 Descarregue a App Oculus VR
- 3 Veja o jogo entre as várias câmaras disponíveis

Gear VR
oculus

SAMSUNG TOMORROW

SAMSUNG NOS SPORT TV



Applications *Professional field*

Theme parks, gaming
centers...



Behind the scenes...
*Rumors et real
challenges*



Behind the scenes...

Rumors et real challenges

- Nausea, vertigo, dry eye

TRUE



Behind the scenes...

Rumors et real challenges

- Nausea, vertigo, dry
eye
- Ocular
herpes

TRUE

FALSE



Behind the scenes...

Rumors et real challenges

- Nausea, vertigo, dry
eye
- Ocular
herpes
- too
expensive

TRUE

FALSE

FALSE



Behind the scenes...

Rumors et real challenges

- Nausea, vertigo, dry

eye
- Ocular

herpes
- too

expensive

Bulky

TRUE

FALSE

FALSE

FALSE



Behind the scenes...

Rumors et real challenges

- Nausea, vertigo, dry

eye

herpes

expensive

Bulky

- Lack of consumer applications

TRUE

FALSE

FALSE

FALSE

FALSE



Behind the scenes...

Rumors et real challenges

- Nausea, vertigo, dry

TRUE

eye

FALSE

herpes

FALSE

expensive

FALSE

Bulky

FALSE

- Lack of consumer

applications

TRUE

- A technology yet to
come



Behind the scenes...

Rumors et real challenges

- Nausea, vertigo, dry

eye

herpes

expensive

Bulky

- Lack of consumer

applications

- A technology yet to

come

- Social impact

(VR)

TRUE

FALSE

FALSE

FALSE

FALSE

TRUE



Behind the scenes...

Rumors et real challenges

- Nausea, vertigo, dry

eye

herpes

expensive

Bulky

- Lack of consumer

applications

- A technology yet to

come

- Social impact

(VR)

- Psychologic

impact

TRUE

FALSE

FALSE

FALSE

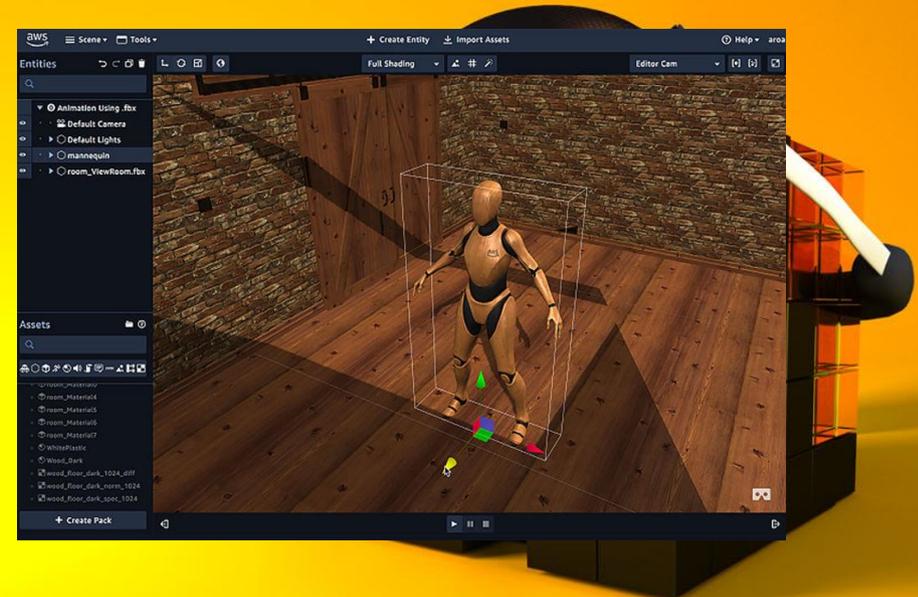
FALSE

TRUE



What prospects ?

Hardware and software improvements (autonomy, mobility, interactivity, resolution...)



What prospects ? *Let's dream*



To conclude...



To conclude...

- Technologies still young but with a large potential



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- Technologies still young but with a large potential
- Invent new uses, being aware of the induced drawbacks



To conclude...

- Technologies still young but with a large potential
- Invent new uses, being aware of the induced drawbacks
- Educate and inform the users of the potentials and the risk.



Furthermore...

DEX

https://www.youtube.com/watch?time_continue=1&v=Sif7cY8qwjM

Pilotage

<https://www.youtube.com/watch?v=vg0A9Ve7SxE>

Court métrage anticipation

<https://vimeo.com/46304267>

Clip VR

<https://www.youtube.com/watch?v=a69EoliYqoE>

Clip VR

<https://www.youtube.com/watch?v=SZ0fKW5PttM>

Clip 360

<https://www.youtube.com/watch?v=mIOiXMvMaZo>

Clip Magic Leap

https://www.youtube.com/watch?time_continue=61&v=GmdXJy_IaNw

Clip Strange

<https://vimeo.com/209070629>

