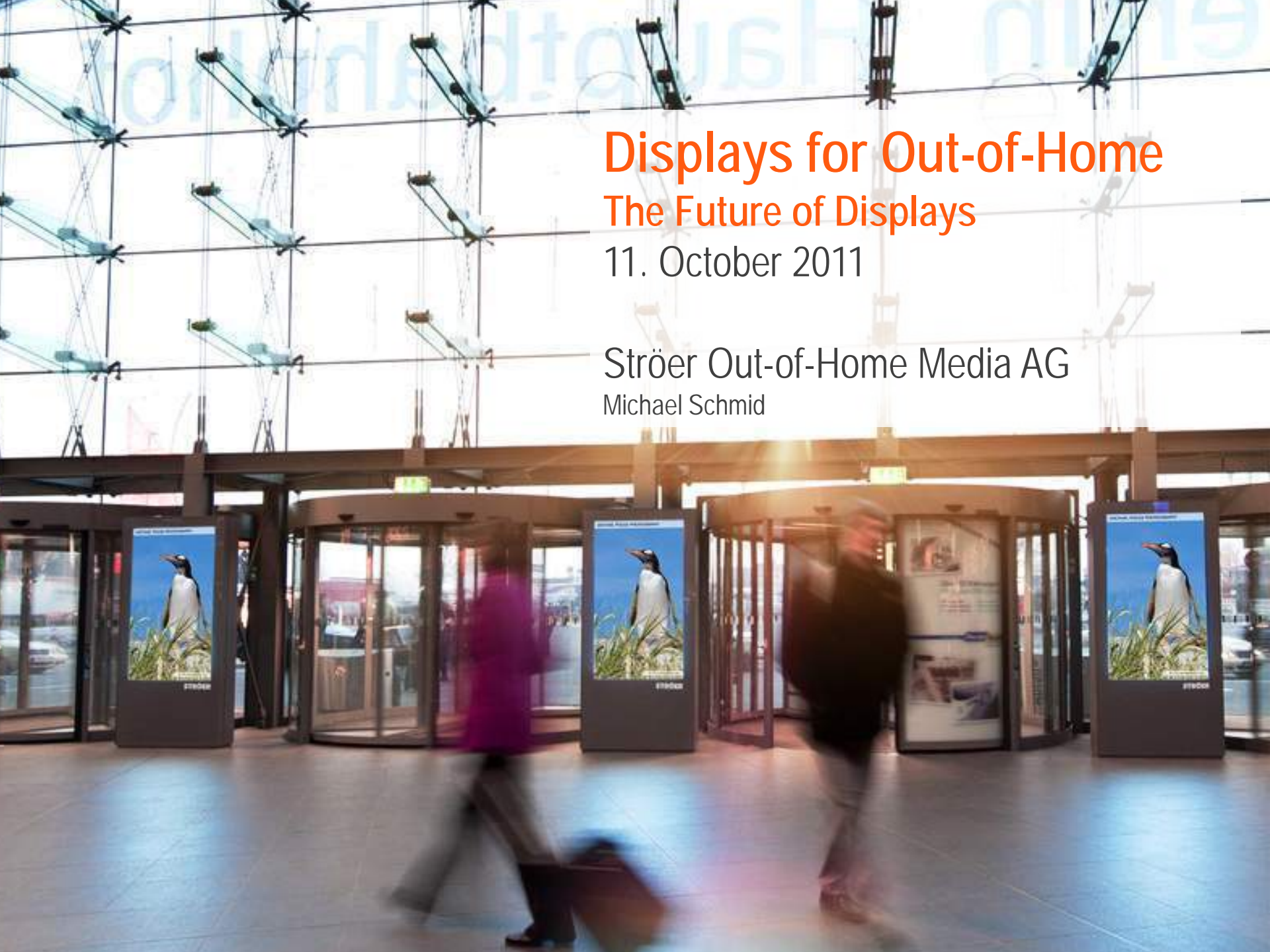


# Displays for Out-of-Home The Future of Displays

11. October 2011

Ströer Out-of-Home Media AG

Michael Schmid



# Agenda

18:19	RE 19449	Schorndorf Schwäbisch Gmünd	Aalen	1
18:22	RE 22049	Plochingen Nürtingen	Tübingen Hbf	1
18:32	RE 19239	Plochingen Göppingen	Ulm Hbf	1
18:41	RE 19927	Backnang Crailsheim	Nürnberg Hbf	1

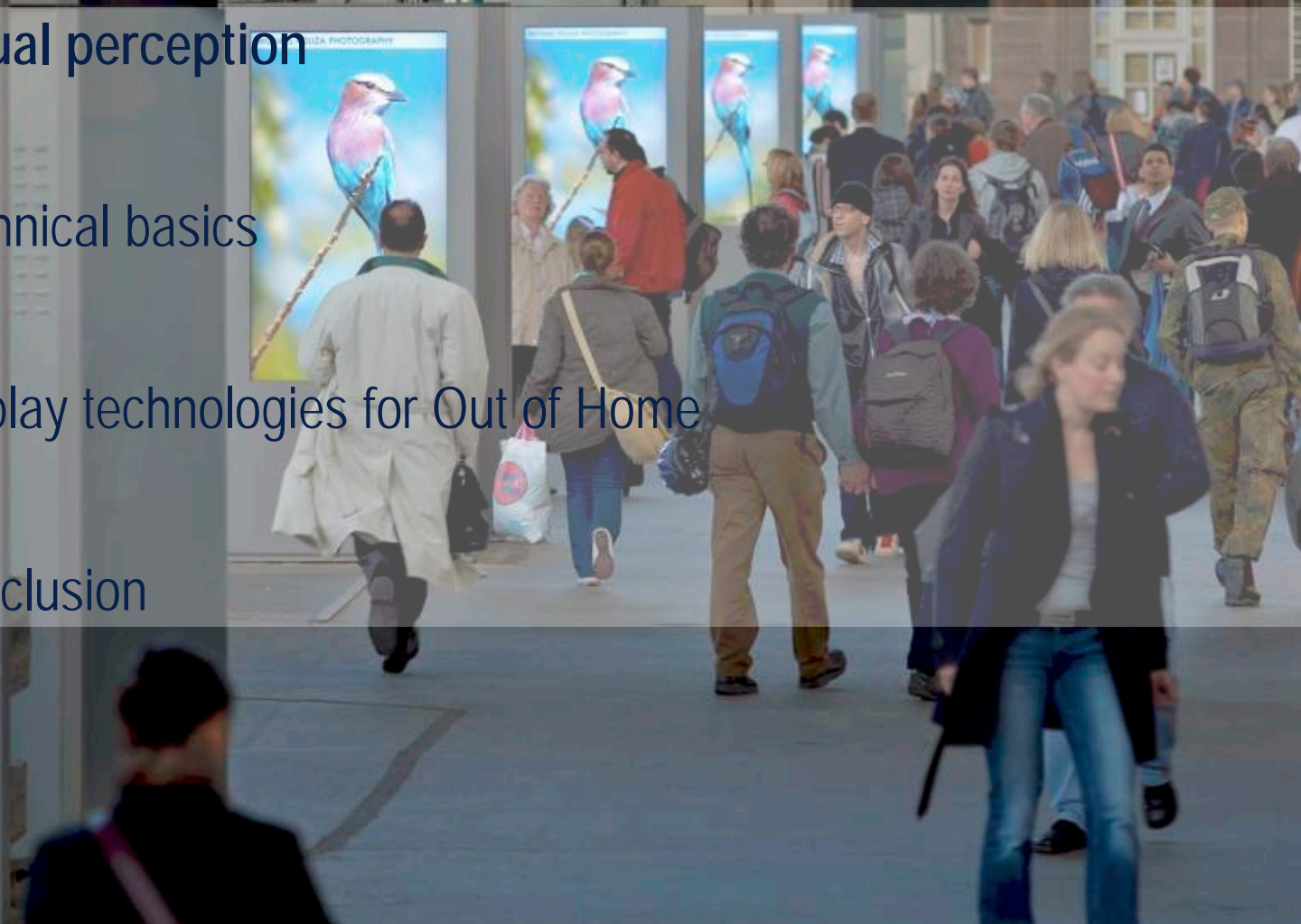
Achtung Sicherheitshinweis! Lassen sie Ihr Gepäck nicht unbeaufsichtigt!  
Attention security advice! Do not leave your baggage unattended!

Visual perception

Technical basics

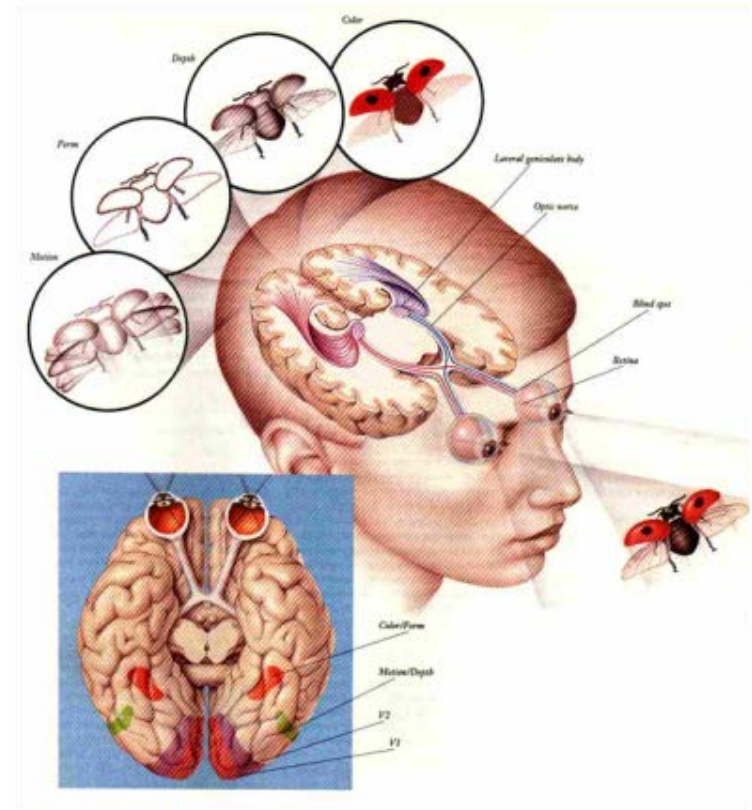
Display technologies for Out of Home

Conclusion



# Visual Perception: What's generally behind?

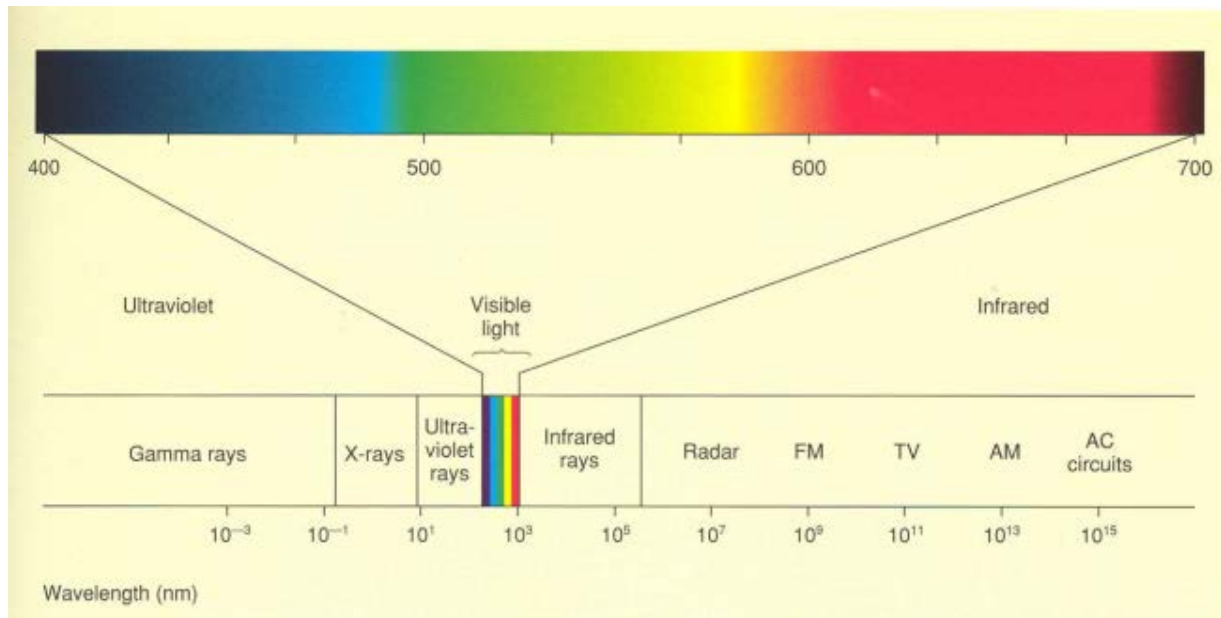
- Main function of the human eye is to detect the optical characteristics of the environment
- Its major parameters are
  - colour
  - brightness
  - sharpness
  - contrast
  - motion and 3D (both eyes)



# Visual Perception: How does colour matter?

The visible spectrum of the human eye is actually limited

The human being can distinguish some 2 million colours:



Most of the commercial displays offer 16.7m and even more colours - why?

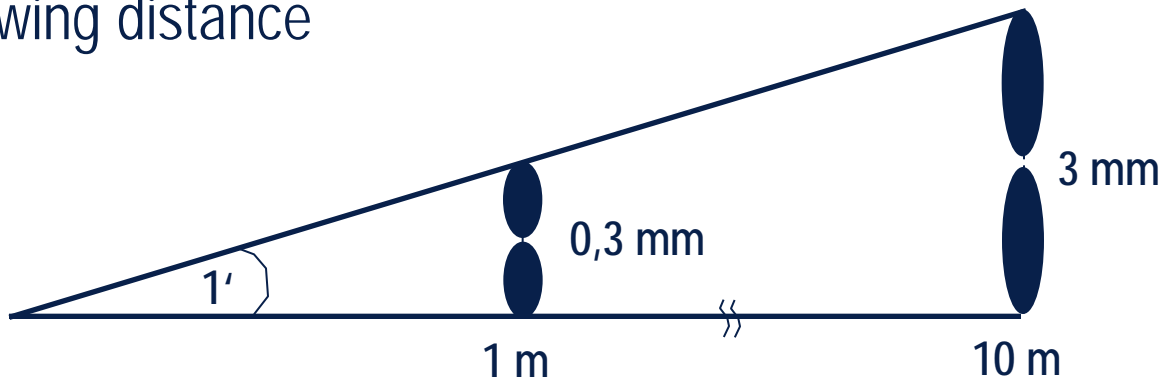
# Visual Perception: Resolution is a derivative of distance and pixels!

Resolution of a display has two major issues

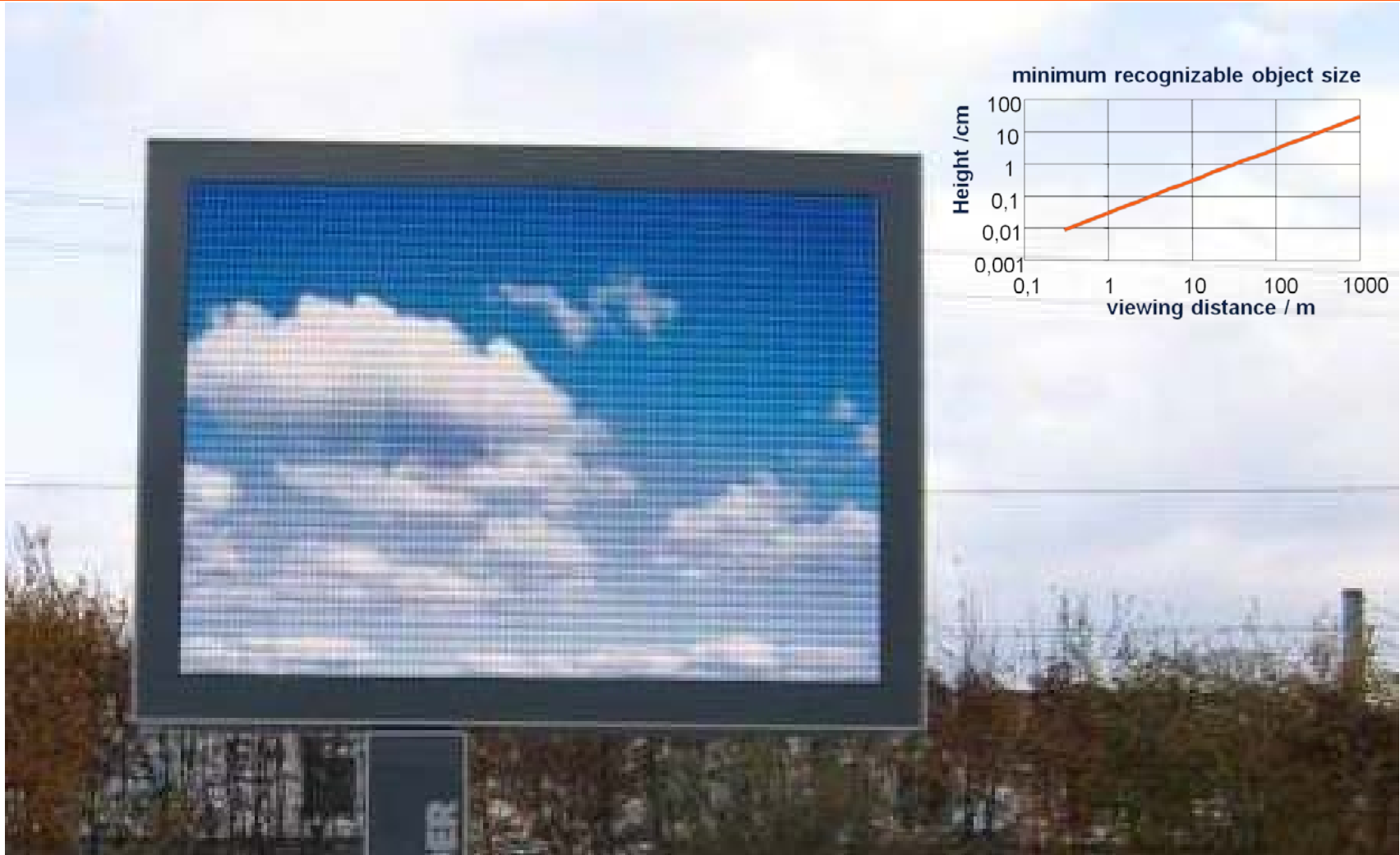
1. Viewing distance (from which distance do I see a good picture?)
2. Number of pixels (do I have enough pixels to show a good picture?)

Max. (resolution) perception of human eye is known

→ adequate resolution of a display can be defined in reference of the viewing distance



# Visual Perception: Examples for pixel sizes and viewing distance



# Visual Perception: The larger the distance – the larger the pixel size

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Display is not “visible” during daylight due to very small pixel size and resolution

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# Visual Perception: Best near-field resolution through HD and Print

Resolution



LED 10 mm  
~ 80.000 pixels



VGA (old monitors, smart phones)  
~ 300.000 pixels



Full HD  
(Out of Home Channel)  
~ 2.000.000 pixels



Print 9 m<sup>2</sup>  
(Megalight)  
~70.000.000 pixels

Number of Pixels



# Visual Perception: Good and bad examples for right technology



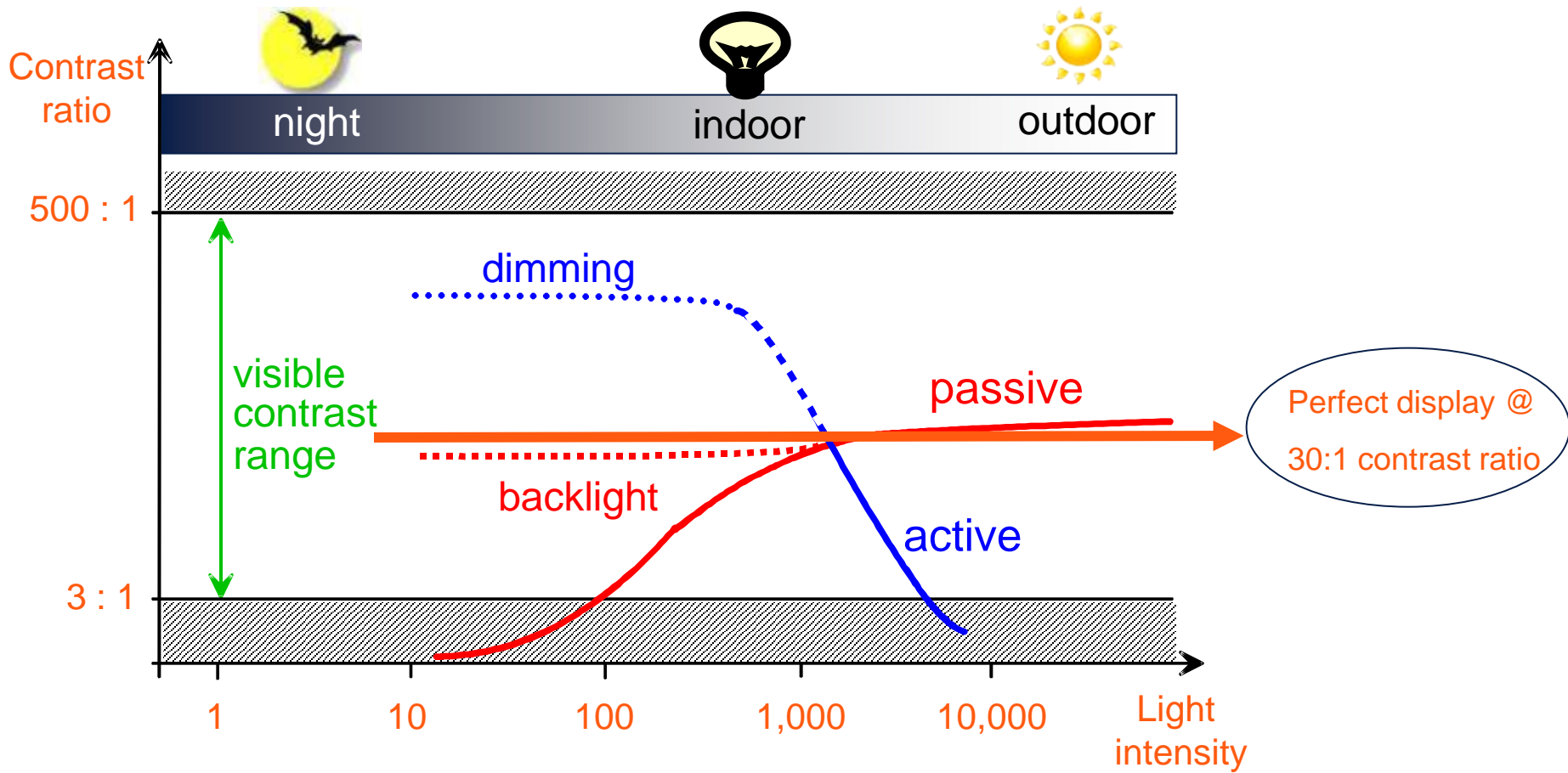
resolution fits image



resolution too small for content



# Visual Perception: Contrast ratio important for display type selection



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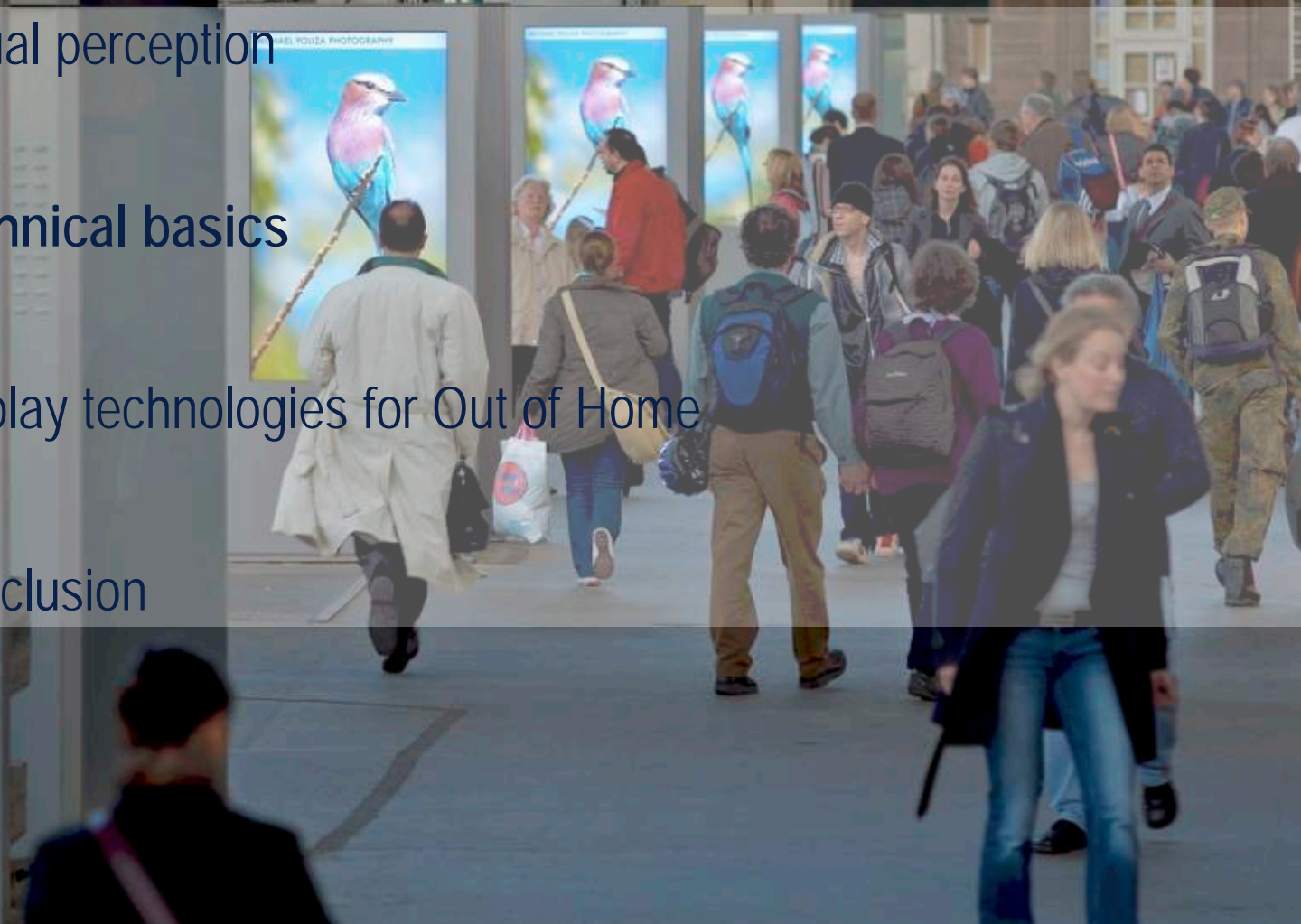
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Visual perception

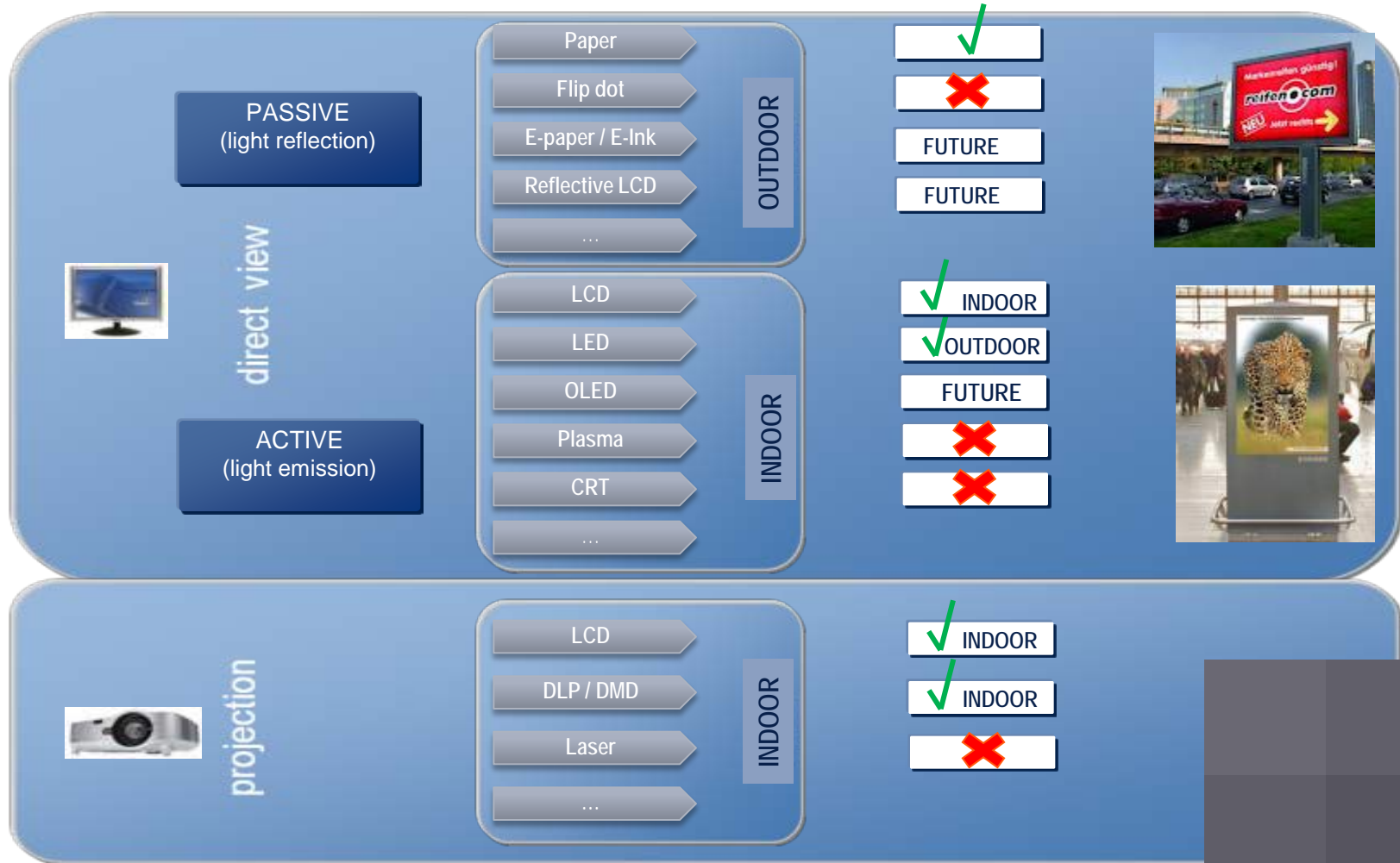
Technical basics

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# Technical Basics: Not all display technologies work out of home



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Conclusion



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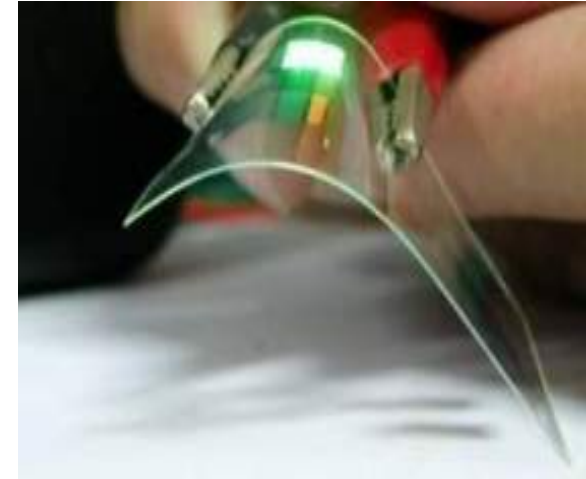


# Display Technologies for Out of Home: Who's to choose?

Technology	Video capabilities 	Capex 	Opex	Scalability 	Sustainability 	Best Purpose 
LCD 	●	◐	◐	◐	○	INDOOR
LED 	●	◐	○	●	○	BOTH
Beamers 	●	◐	◐	○	○	INDOOR
OLED 	●	○	●	○	◐	INDOOR
Bistable / Reflective 	○	○	●	●	●	BOTH

● = high    ○ = low    ◐ = medium

# Display technology for future out of home: OLED



- > Effect: „lightning plastic“
- > Very easy technical structure compared to LCD
- > Very good optical characteristics
- > Not commercial for big sizes yet
- > High potential for indoor applications



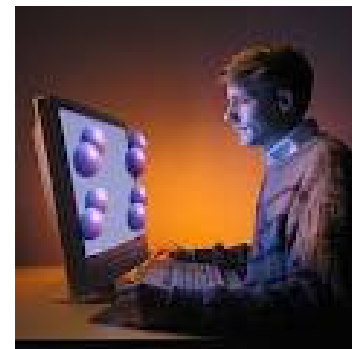
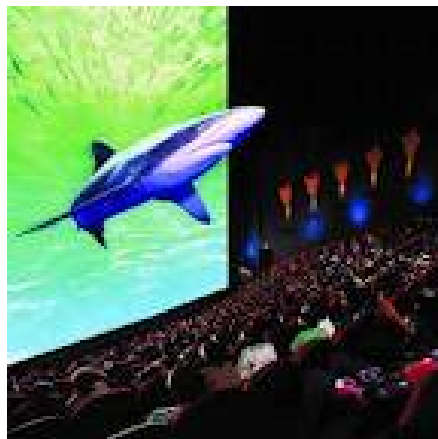
# Display technology for future Out Of Home: Bistable & Reflective



- > Different technologies
- > Full bistability & reflectivity
- > Most have problems with video and colour
- > Most not commercial for big sizes yet



# Display technology for future Out Of Home: 3D



- > General two ways: with and without glass
- > For out of home: without glass
- > Technically very demanding
- > Today only a few solutions, most very limited viewing angles
- > Challenges not only display technology but also content creation

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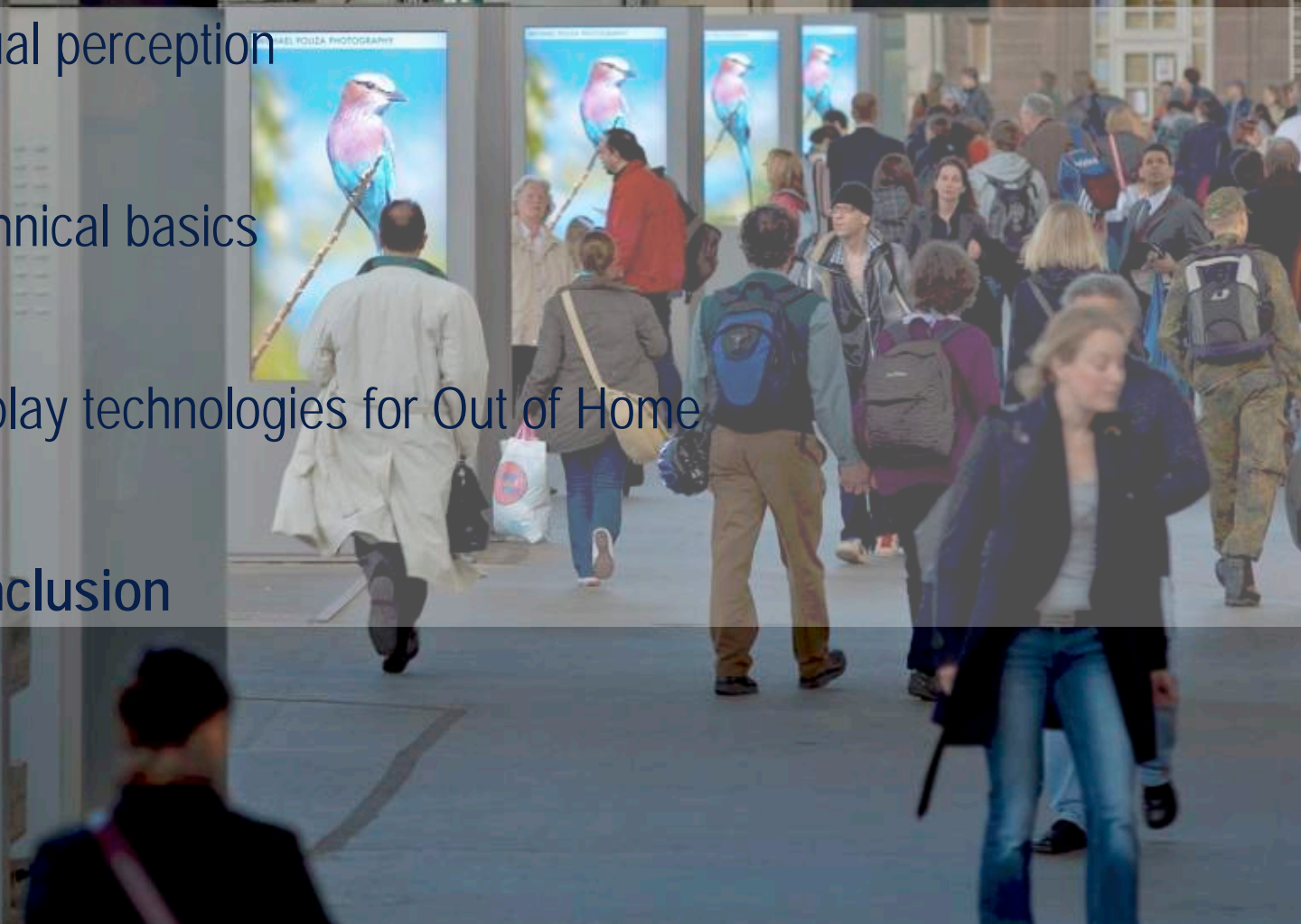
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# Conclusion

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## Today

For each application we have to work with a different display technology regarding its specific requirements

- Indoor up to 2 m<sup>2</sup>: LCD's
- Indoor bigger: tiled LCD's or LED's
- Outdoor: LED's

## Future

- Better (greener) LCD's and LED's
- Bistable and reflective technologies!



There will be no single display technology fulfilling all requirements of all applications

Thank you

