

# Activities at SC 24 WG 9: An Overview



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**ISO JTC 1 SC 24 WG9**

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# Mixed and Augmented Reality (MAR)

## Mixed Reality Continuum

Physical  
Reality



**Augmented Reality**  
(Physical > Virtual):  
"adds" computer-generated  
information to the real world  
(Azuma et al. 2001)



**Augmented Virtuality**  
(Physical < Virtual):  
"adds" real information to  
a computer-generated  
environment  
(Regenbrecht et al 2004)



Virtual  
Reality



# ISO SC 24 and MAR



- ISO-IEC JTC 1 SC 24
  - Have developed standards for computer graphics and virtual environments such as X3D
  - Extension into mixed/augmented reality environment
    - ✦ Formation of WG 9 in 2011 (devoted to MAR)

# Current Work Items



- MAR Reference Model (18039) – FDIS submitted (balloting/Dec 2018)
  - Joint work with SC 29 WG 11 (JAhG on MAR)
- Sensor representation for MAR (18038) – CD (DIS being prepared)
- Live actors and entity representation for MAR (18040) – DIS (FDIS/IS being prepared)
- Benchmarking for MAR (18520) – IS (Approved Jan, 2019) *First IS from WG 9 !*
- MAR content information model (21858) – about to submit for CD
- Image based Object/Environment Representation for Virtual/Mixed and Augmented Reality (23488) – CD/NWIP (CD2 or DIS being prepared)
- *New: Display Device Interface for MAR (23763) –Approved Jan,2019*
- *New: Information Model for Live Actor and Entity in MAR (23490) – Approved Jan 2019*
- *Material Property and Parameter Representation for Model based Haptic Simulation of Objects in Virtual, Mixed and Augmented Reality (VR, MAR) - Technical Report, Submitted Aug 2018 (?)*

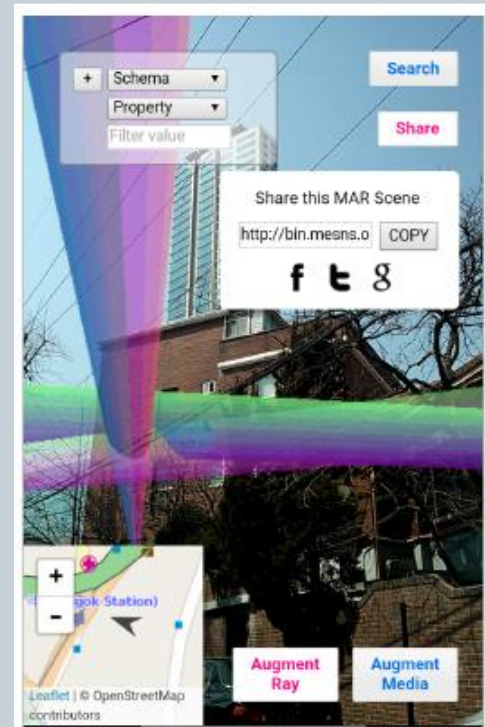
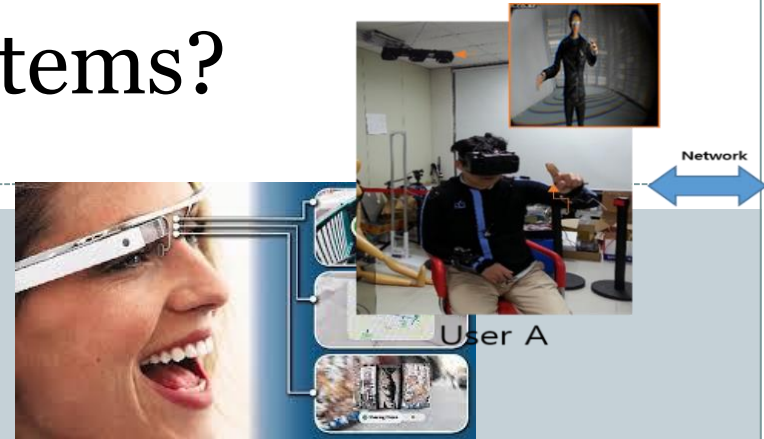
# Current Status



ISO/IEC 18039	MAR reference model	FDIS*	<a href="#">2018-08-22</a>
ISO/IEC 18040	Live actor and entity representation in MAR	DIS	2019-01-25
ISO/IEC 18038	Sensor representation in MAR	CD	2019-01-25
ISO/IEC 18520	Benchmarking of vision-based geometric registration and tracking methods for MAR	FDIS*	2017-12-10
ISO/IEC 21858	Information model for MAR contents	AWI/WD	<a href="#">2018-08-08</a>
ISO/IEC 23488	Image based Object/Environment Representation for Virtual/Mixed and Augmented Reality	AWI/CD?	2019-08-08
ISO/IEC 23763	Display Device Interface for MAR (Approved Jan,2019)	AWI/CD?	?
ISO/IEC 23490	Information Model for Live Actor and Entity in MAR (Approved Jan 2019)	AWI/CD?	?
Technical Report ?	Material Property and Parameter Representation for Model based Haptic Simulation of Objects in Virtual, Mixed and Augmented Reality (VR, MAR)	Submitted Aug 2018 (?)	

# Future Work Items?

- IoT and MAR
- MAR Contents
  - Webizing MAR contents
  - Meta information for MAR
- Applications:
  - Multi-user Telepresence / Tele-existence
- Ergonomics for MAR
  - Visualization requirements and environment dynamics
- Multimodality
  - Haptics, Tactility, ...
- Process
  - Ergonomics
  - UX evaluation for MAR/VR



# Coordination with others



- X3D / Web3D / SEDRIS (SC24)
  - Already has a rich and mature 2D/3D representation scheme and file format
  - Can be used as scene representation for AR (which is really VR space)
  - Can be used for 2D/3D object representation and their behaviors (X3DOM, Behavior nodes, etc.)
  - Working closely with Web3D AR WG
  - Real world object representation with SEDRIS
- Commercial Sector: Google ARCore, Apple ARKit, WebVR, WebXR, OpenXR, ...
- W3C / HTML 5
  - POI Working Group ?
  - WebGL / Declarative 3D
  - Trend: Web is “housing” everything
    - ✦ Video, Audio, 3D Virtual, Documents, Interactivity, ...
    - ✦ Web browser vs. MPEG browser vs. X3D browser

# Conclusion



- Reference model fulfilling its role as the basis and starting point for standardization
  - Other work items are becoming mature ... reaching CDs/DISs
  - New works are steadily coming in ...
  - Areas diversifying: system. contents, evaluation, benchmark, ...
- AR/MR is steadily developing ...
  - Still need more expert participation is needed
  - Need to address the widening needs of the industry
  - Much more active publicizing our efforts and results is needed
  - Application standards need to be derived for immediate industrial impact
- VR and MR/AR is merging! (XR?)
  - E.g. Glasses that can switch between VR and MR modes



# WG 9 Workshop: Session 1 (WG 9 work items)

Jan 23, 2019 (B1 Chardonnay Room) – Chair: Gerard J. Kim



- 09:15-09:30 Agenda, Progress within WG 9, Convener / Gerard Kim (Korea U.)
- 09:30-10:15 Information model for MAR contents, Gerard Kim (Korea U.)
- 10:15-10:30 Support for flexible haptic simulation in MAR, Seokhee Jeon (Kyunghee U.) and Gerard Kim (Korea U.)
- 10:30-11:00 Coffee break
- 11:00-11:30 Sensor representation in MAR, Myeong Won Lee (Suwon U.)
- 11:30-11:50 Live actor and entity representation in MAR, Kwan-Hee Yoo (Chungbuk National U.)
- 11:50-12:15 Information model for LAE in MAR, Kwan-Hee Yoo (Chungbuk National U.)
- 12:15-12:30 Discussion
- 12:30-14:00 Lunch

# WG 9 Workshop: Session 1 (WG 9 work items)

Jan 23, 2019 (B1 Chardonnay Room) – Chair: Gerard J. Kim



- 14:00-14:30 Benchmarking of vision-based spatial registration & tracking for MAR, Takeshi Kurata (AIST)
- 14:30-15:00 Display device interface for MAR, Kwan-Hee Yoo (Chungbuk National U.)
- 15:00-15:30 Image based object/environment representation for VR/MAR, Changhyun Jun and Gerard J. Kim (Korea U.)
- 15:30-16:00 Discussion / Coffee break

# SG for Systems Integration Visualization

Jan 23, 2019 (B1 Chardonnay Room) - Chair: Peter Ryan



- 16:00-16:30 Smart city healthcare information interface,  
Seung-Pyo Lee (Seoul National U.) and Myeong Won Lee (Suwon U.)
- 16:30-17:00 Smart city representation model,  
Peter Ryan (DSTO) and Myeong Won Lee (Suwon U.)
- 17:00-17:30 Smart city visualization, Peter Ryan (DSTO)
- 17:30-18:00 Virtual training systems architecture, Myeong Won Lee (Suwon U.)
- 18:00-18:30 Discussion

# WG 9 Workshop: Session 2 (Potential new work item proposals)

Jan 24, 2019 (B1 Chardonnay Room) – Chair: Gerard J. Kim



- 09:00-9:15 Application standards for MAR - Tele-existence SNS, Bumjae Yoo (KIST) and Gerard Kim (Korea U.)
- 09:15-9:30 MAR visualization requirements for AR based training, Gerard Kim (Korea U.)
- 09:30-10:00 Webizing MAR contents, Byounghyun Yoo (KIST)
- 10:00-10:30 Standard for metadata configuration to match scale and color difference among heterogeneous MR devices, Dongsik Jo (Wonkwang U.), Howon Kim (ETRI) and Gerard Kim (Korea U.)
- 10:30-11:00 Coffee break
- 11:00-12:00 Standards for usability/UX evaluation process of VR/MAR contents, Wajahat Ali Kahn, Sung Ryong Lee (Kyunghee U.) and Gerard Kim (Korea U.)
- 12:00-12:30 Discussion
- 12:30-14:00 Lunch

# WG 9 Workshop: Session 2 (Potential new work item proposals)

Jan 24, 2019 (B1 Chardonnay Room) – Chair: Gerard J. Kim



- 14:00-14:30 xDR (PDR & VDR) Challenge: survey on indoor localization competitions and benchmarking activities, Takeshi Kurata (AIST)
- 14:30-15:00 Non-visual augmented reality as an accessibility tool for people with visual impairments, ChungWeon Oh (Namseoul U.)
- 15:00-15:30 Discussion / Coffee break
- 15:30-16:00 Web3D activities on MAR, Nicholas Poly (Virginia Tech)
- 16:00-16:30 Liaison agreement between SC24 and Khronos Group, Hwanyong Lee (Ajou U.)
- 16:30-17:00 ISO PAS development for glTF, Hwanyong Lee (Ajou U.)