The Standards People

ETSI Industry Specification Group Augmented Reality Framework (ISG ARF): activities overview and outlook

Presented by: **Ludovic Noblet**

For: **Immersive Media meets 5G Workshop**

15-16 April 2019

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The context

- AR is a **growing and promising market** with high revenue forecast e.g. 120$B by 2021
- **Clear and long-term RoI benefits** based on improvements and efficiency gains
- **Acquisition of AR solutions by large companies**
  - Risk of control of AR technologies by only a few large actors -> vertical siloes
- **A set of common key components**: Tracking, localization, pose estimation, 3D reconstruction, cloud storage and more
- **Lack of standards adoption**:
  - Adoption of standards bring interoperability
- **Creation of an Industry Specification Group at ETSI** - a European standards organisation with a global impact

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Overall Objective of the ISG ARF

- **Defining a framework for the interoperability of AR applications and services, in order to prevent market fragmentation and enable providers to offer part of an overall AR solution**
  - To encourage an ecosystem with a diverse range of solution providers including smaller players, new entrants and academics
  - To define a modular architecture and achieve interoperability at the interface of building blocks
    - The focus is on interfaces, no standardisation of core technologies
    - The building blocks can be open source, proprietary or standardised technologies
- **Achieving Interoperability:**
  - Will give end-users confidence to invest in and use (future proof) AR solutions
  - Can prevent lock-in situation with a single vendor
  - Can ease technology swapping, e.g. to improve applications performance and services

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ARF Members and Participants

b com

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Invented for life

DiGITA
Digital. People. Efficiency.

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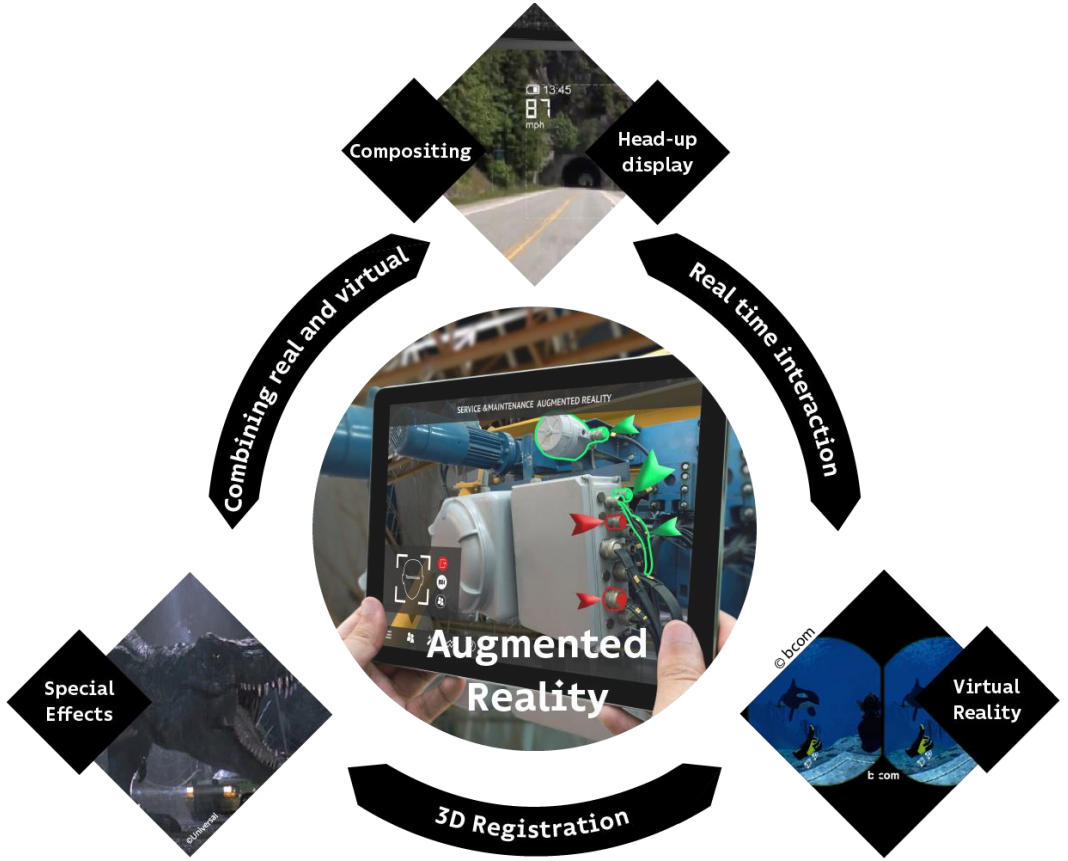
Definition of AR

- Augmented Reality (AR) is the ability to mix in real-time spatially-registered digital content with the real world.
  - Combines real and virtual
  - Interactive in real-time
  - Registered in 3D



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What does an AR system require?

- Mix digital content with the real world : Rendering interfaces
  - Vision
    - Video see-through displays (smartphones, tablets, etc.)
    - Optical see-through displays (AR glasses, AR windshield, etc.)
    - Projection
  - Spatialized Audio
  - Haptics
- Spatially registered : Localisation Sensors & Computer Vision / AI algorithms
  - Vision (RGB cameras, Depths sensors, etc.)
  - Exteroceptive (GPS, Wifi, Lifi, cellular, etc.)
  - Proprioceptive (IMU, odometer, etc.)

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What does an AR system require?

- In real-time : Powerful processing units
  - CPU, GPU, Vision Processing Unit, Tensor Unit
- Interactive content : Interaction devices
  - Tactile
  - 3D gestures
  - Vocal
  - Eye-tracking
  - Cognition and Emotion analysis (Brain Computer Interfaces, etc.)
  - Haptics
- Digital Content : 3D contents, scenarios, and a rendering engine
  - 3D rendering engine (Unity, Unreal Engine, etc.)
  - 3D Content (export from PLM, BIM, designed by computer graphics designers, scripts, etc.)

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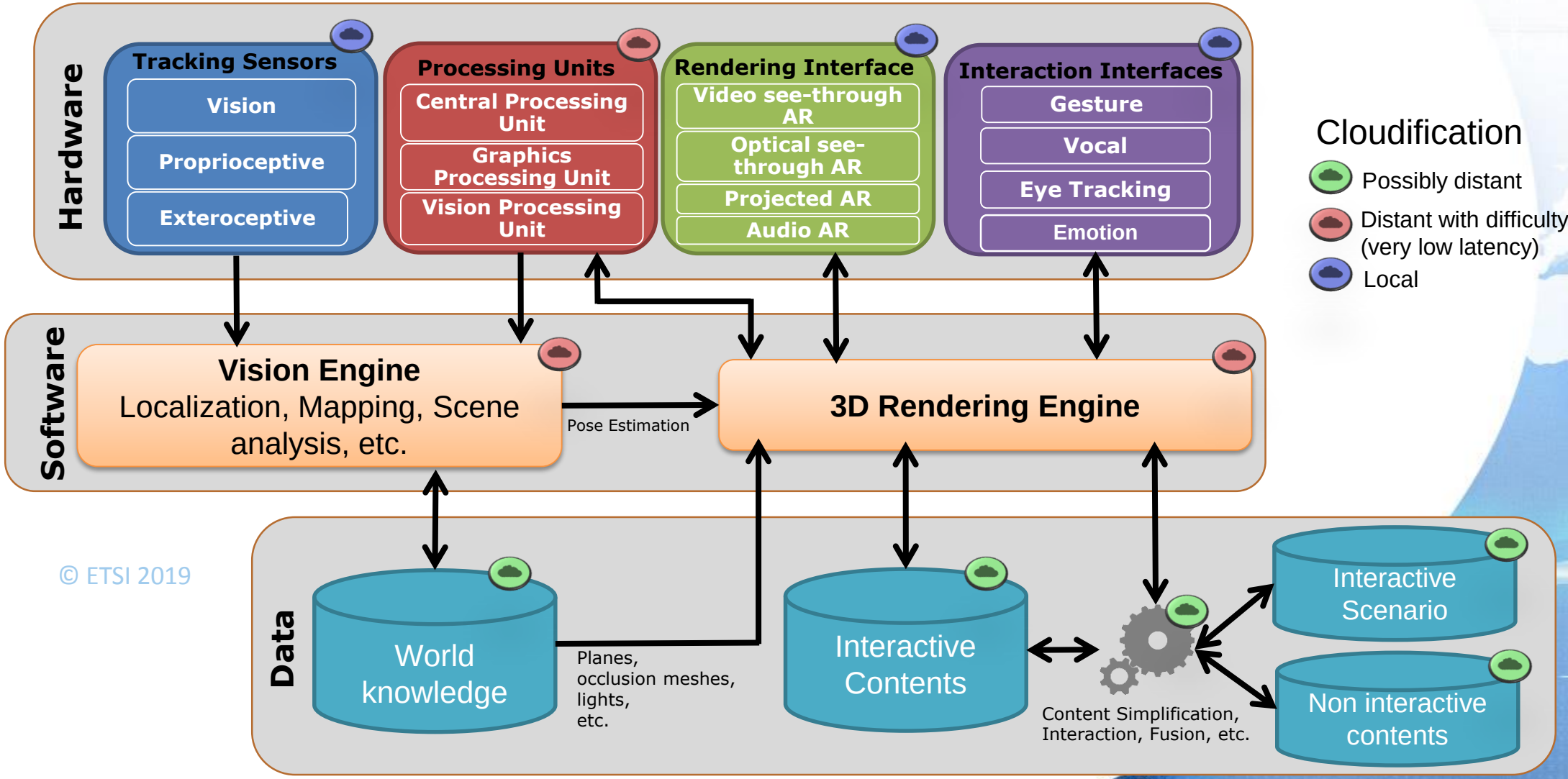
AR Framework architecture - Draft



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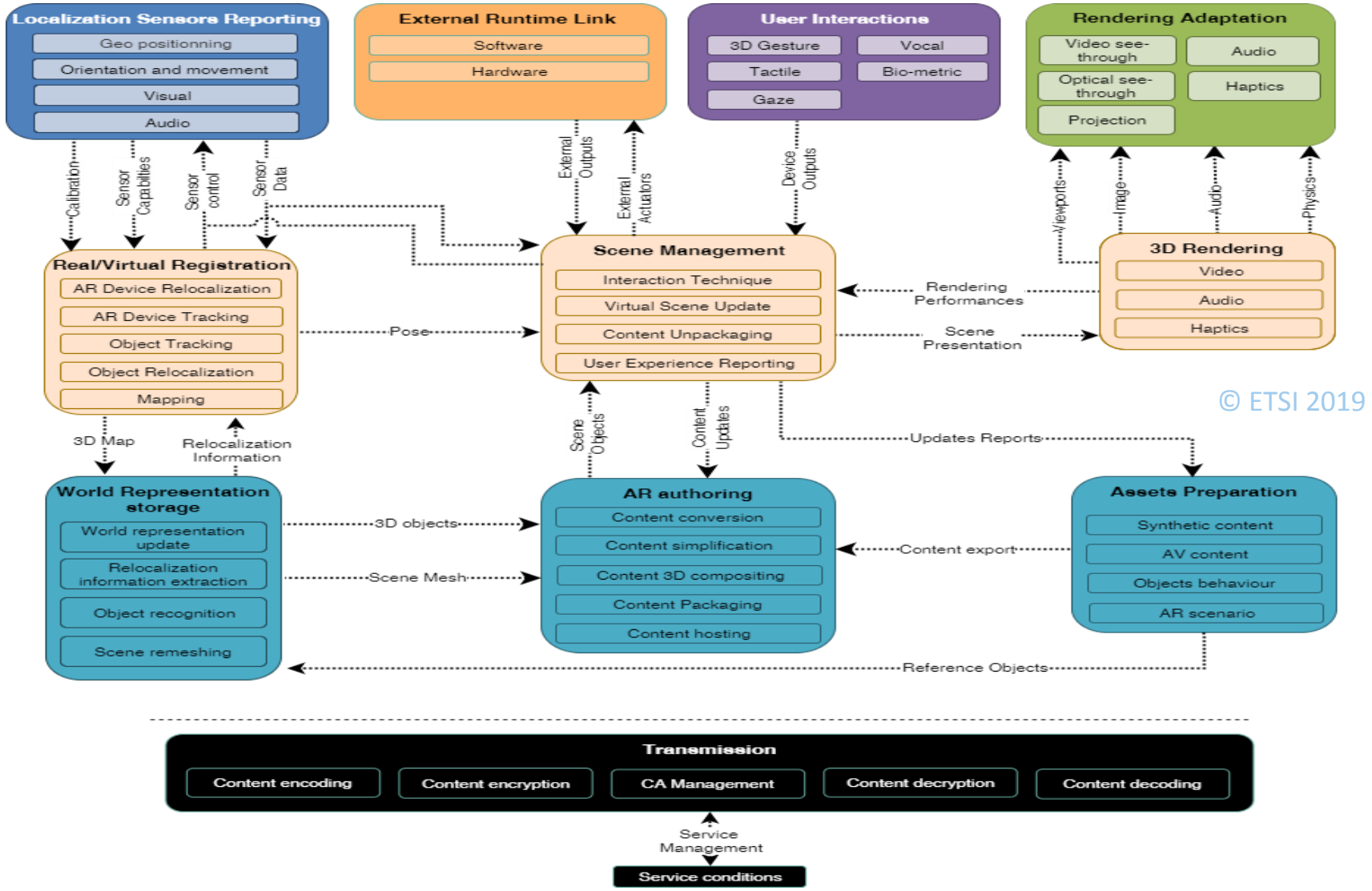
Proposed functional architecture



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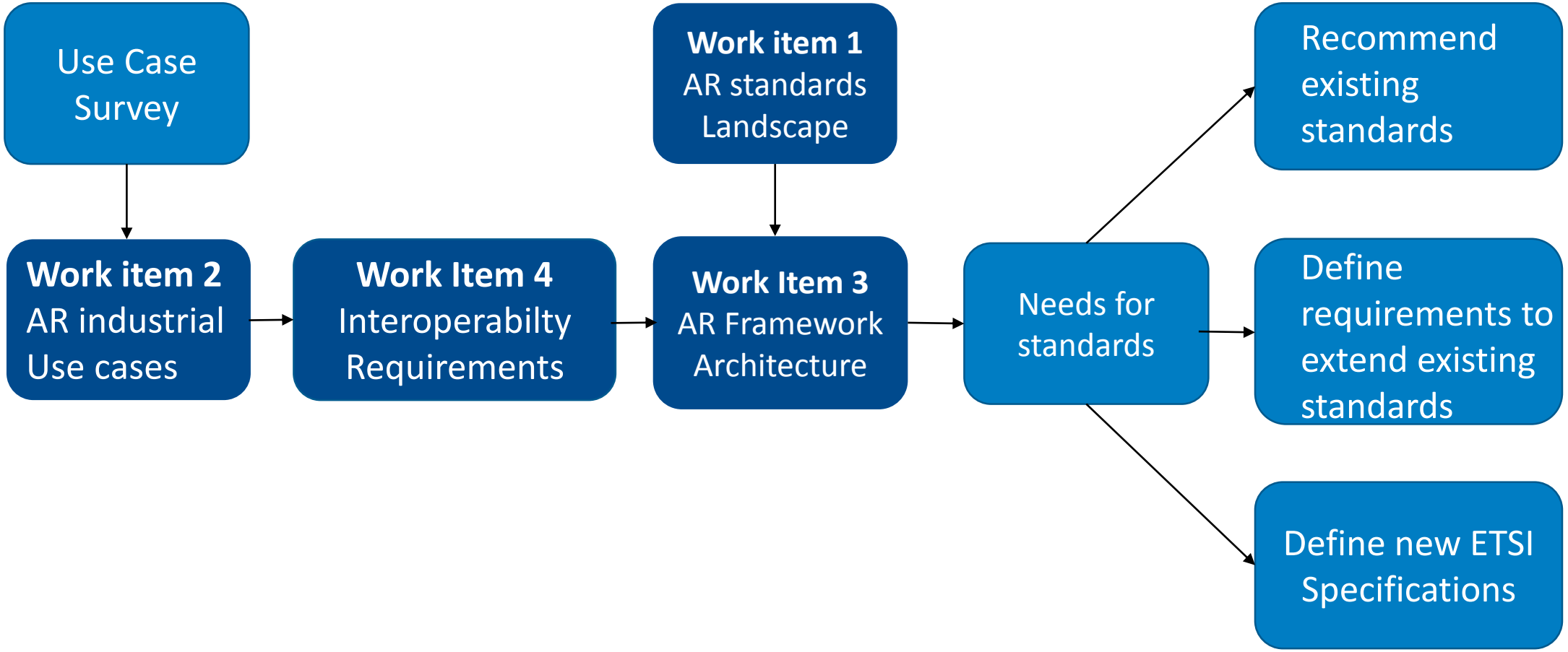
ISG ARF Workplan



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AR standards landscape

- A group report **identifying the role of existing standards relevant to augmented reality**
  - various standards setting organisations and fora reviewed: ISO/IEC, W3C, Khronos, IEEE, IETF, OGC, …
- **Rapporteur** : Marius Preda, Institut Mines Telecom
- Standards under review are:
  - directly addressing AR as a whole,
  - or addressing key technological components that can be useful to increase interoperability of AR components and services.
- Report expected to be **published before the summer**

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Industrial use cases for AR applications and services

- A group report **describing typical industrial use cases for AR** applications and services
- **Rapporteur**: Ralf Schäfer, Fraunhofer HHI
- A questionnaire was developed to collect information about typical AR use cases and the conditions under which AR is used.
- The survey, available in English, German and French, was online between 28/02/2018 and 01/05/2018.

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Structure of the Questionnaire

- Usage area
- Expectations of users on AR
- Level of experience with AR
- Use Case analysis
  - Benefits of AR
  - Usage conditions
  - Level of data protection
  - Sources of augmentation data
  - Technical usage conditions
  - Operating conditions
  - Feedback options
  - Level of experience in AR usage
- Experienced bottlenecks & limitations in AR usage
- General perception of the development of AR during the last 2 years

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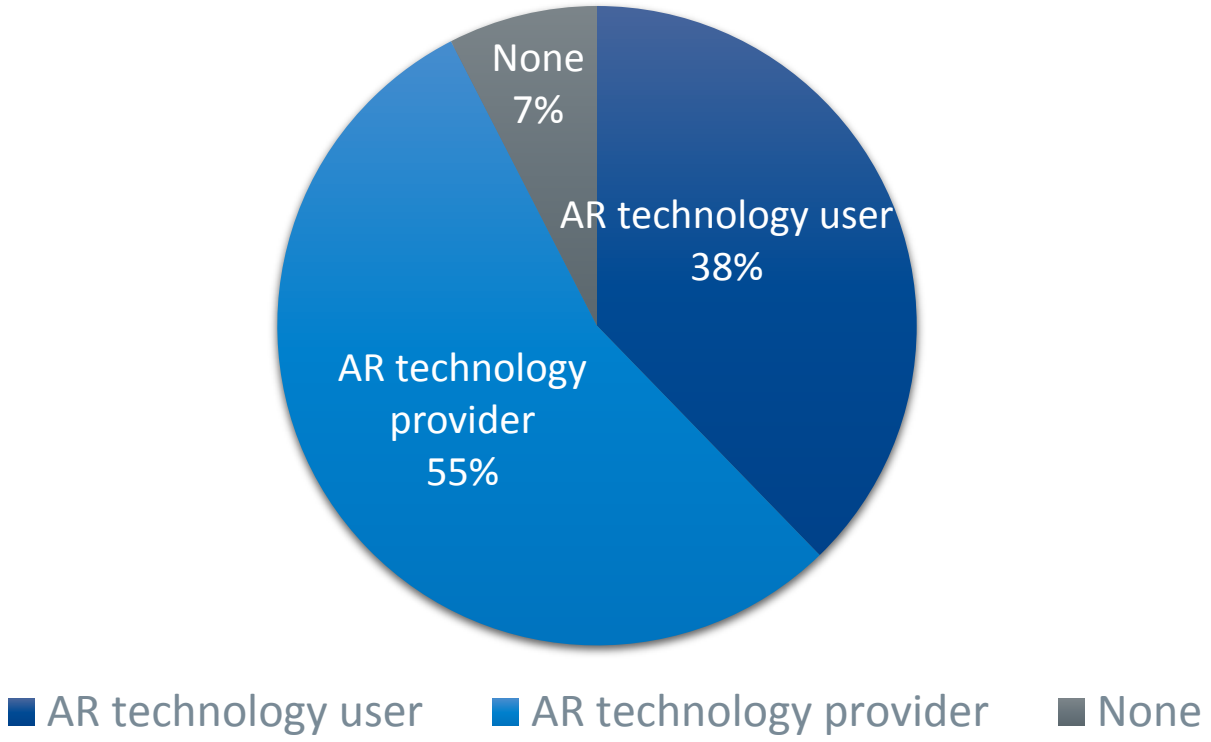
Participants profile

Without academics

55% of the participants define themselves as Technology PROVIDERS over Technology USERS



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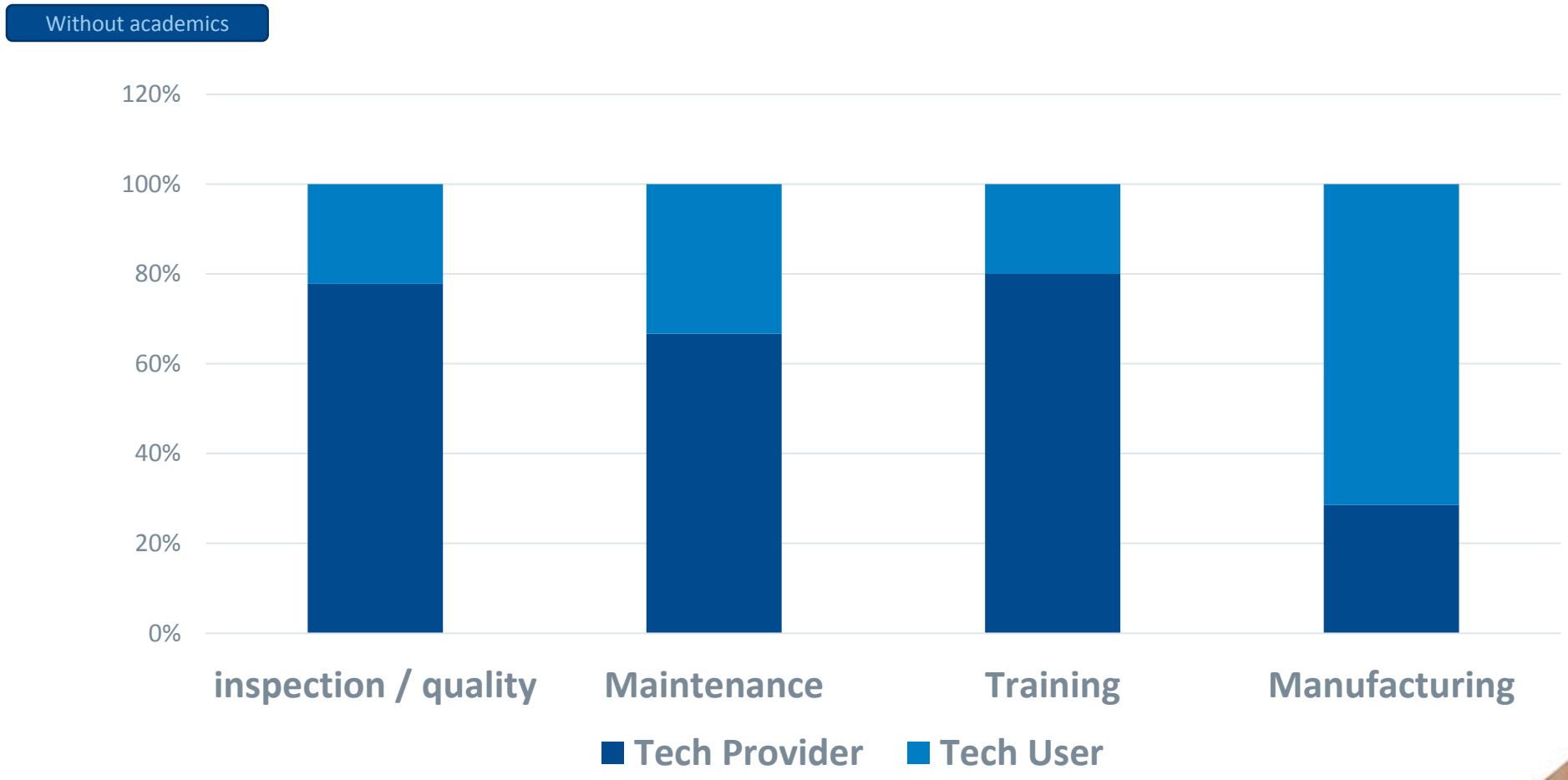
AR use-cases Profiles



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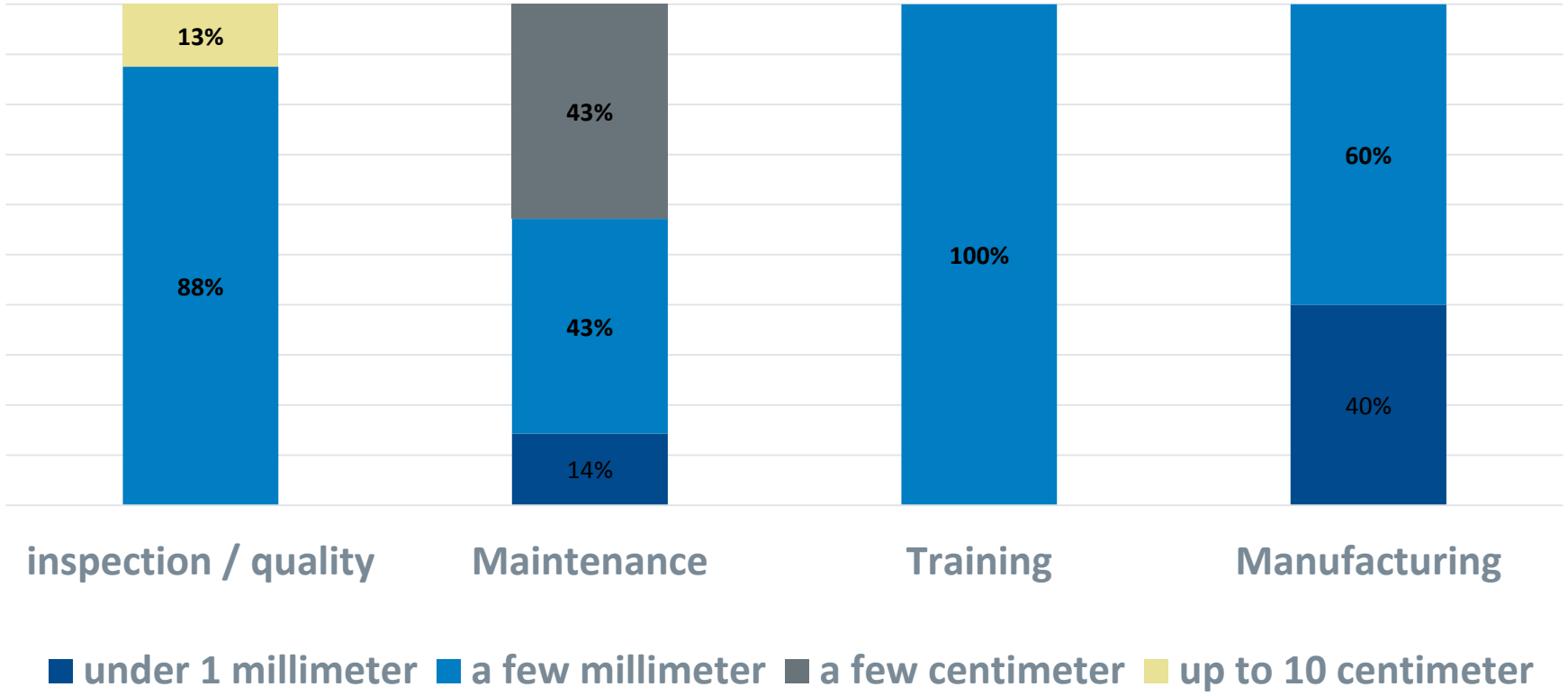
AR use-cases - Accuracy

Without academics

Do the augmentations need to be precisely located relative to a real equipment or object ?



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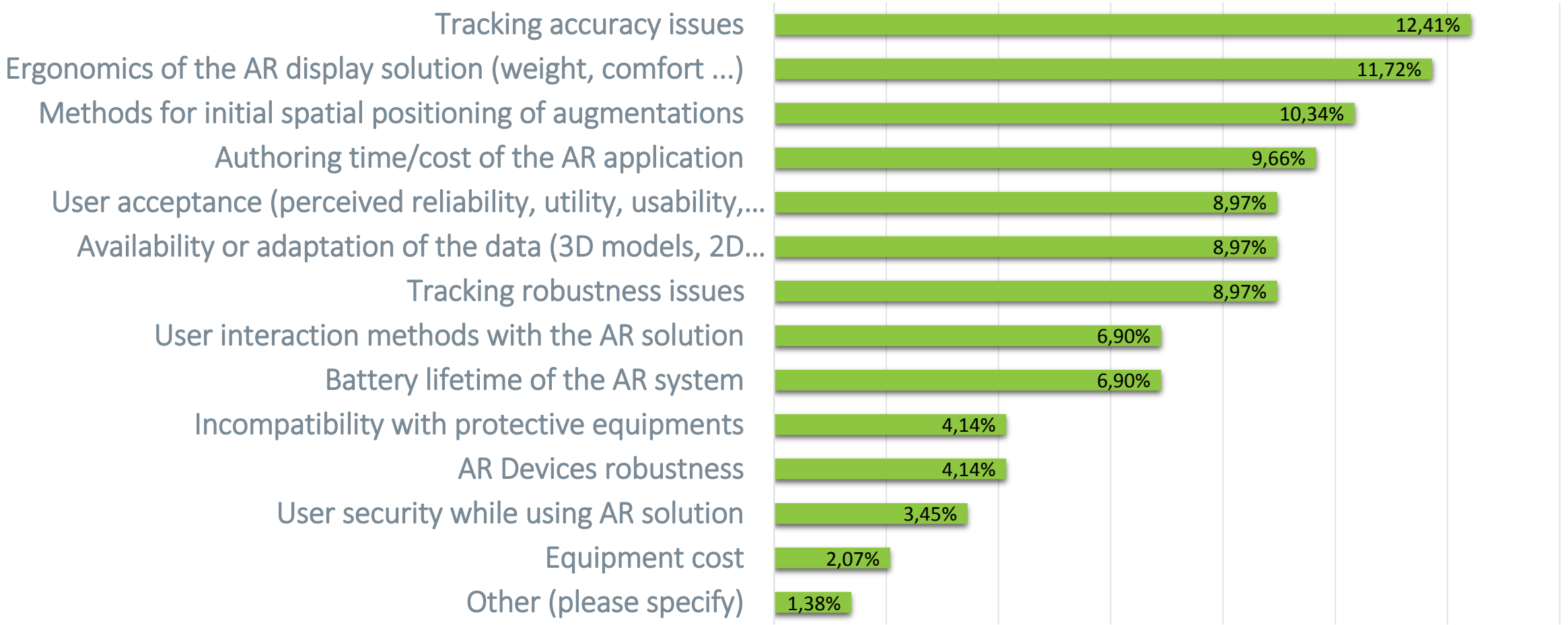
Mentioned challenges of AR

Without academics



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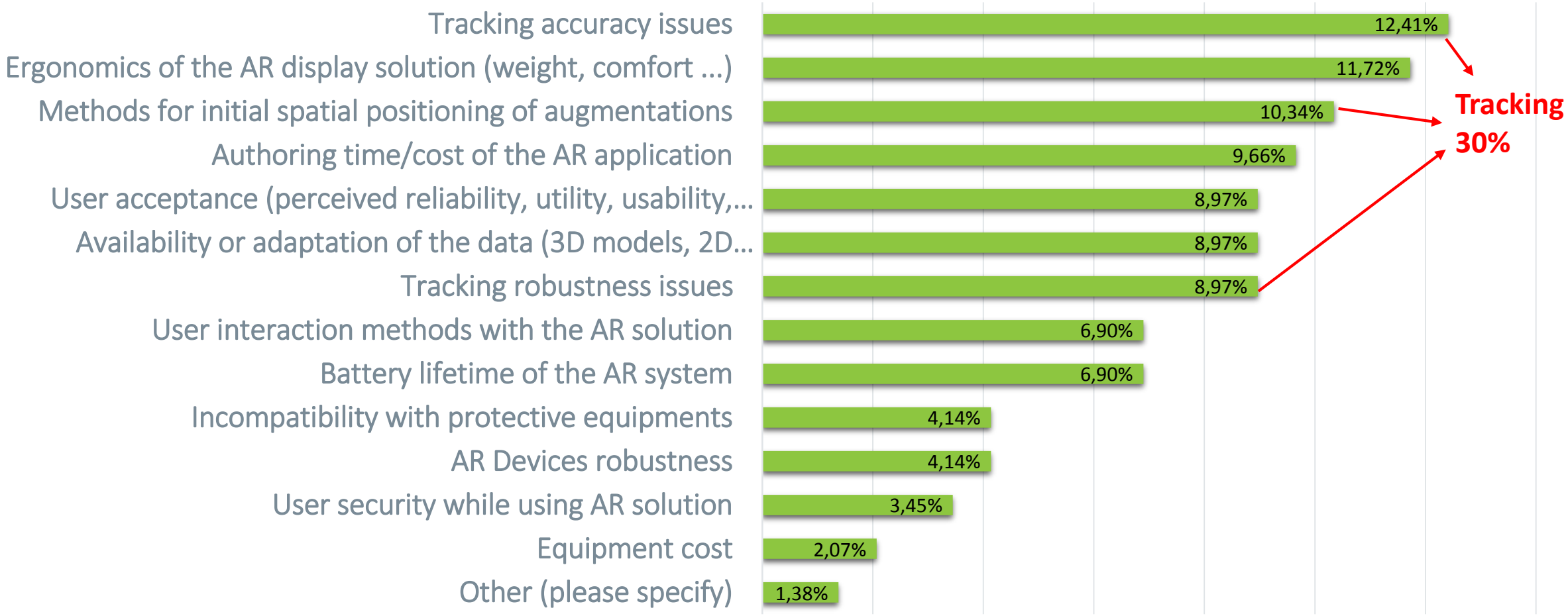

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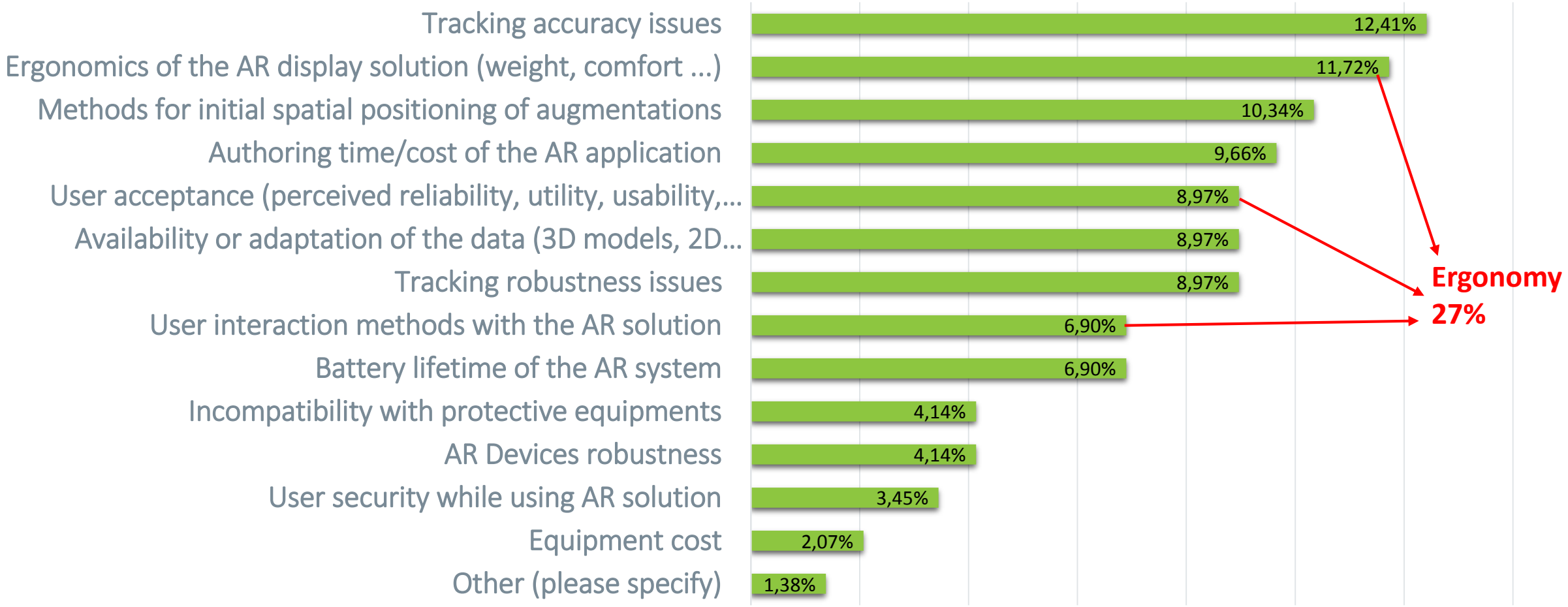

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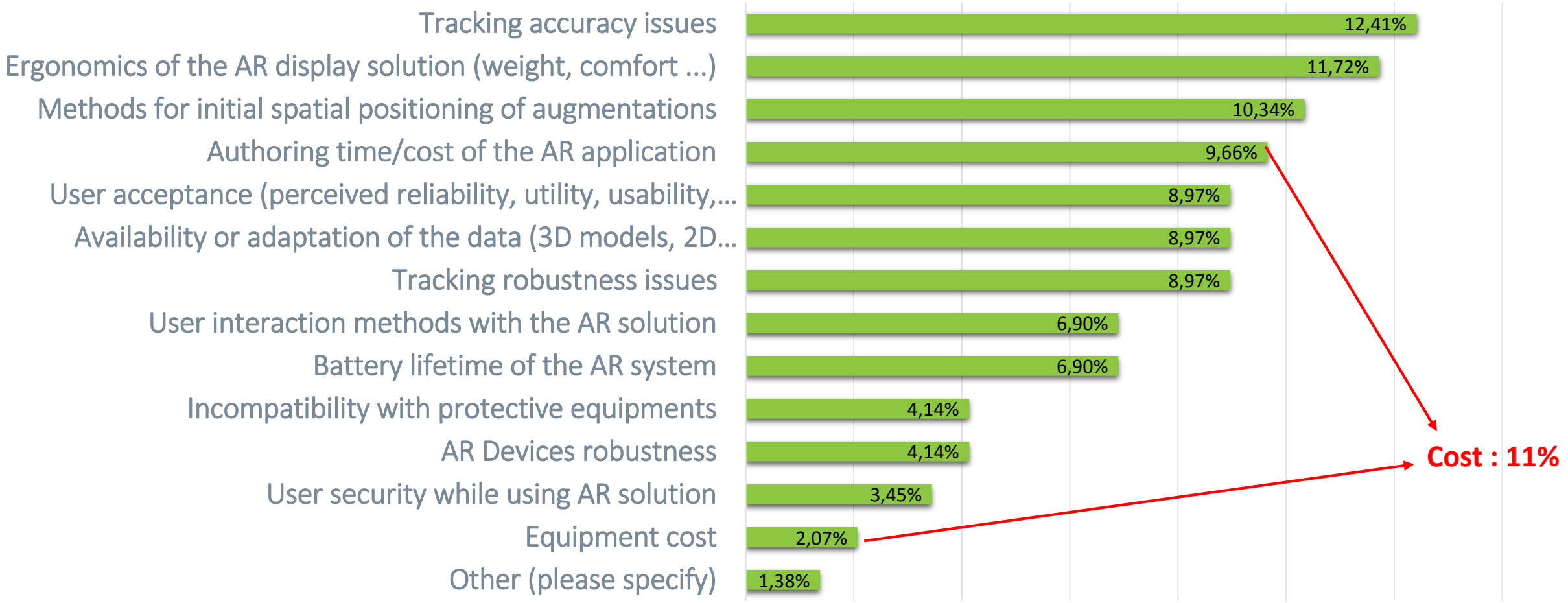

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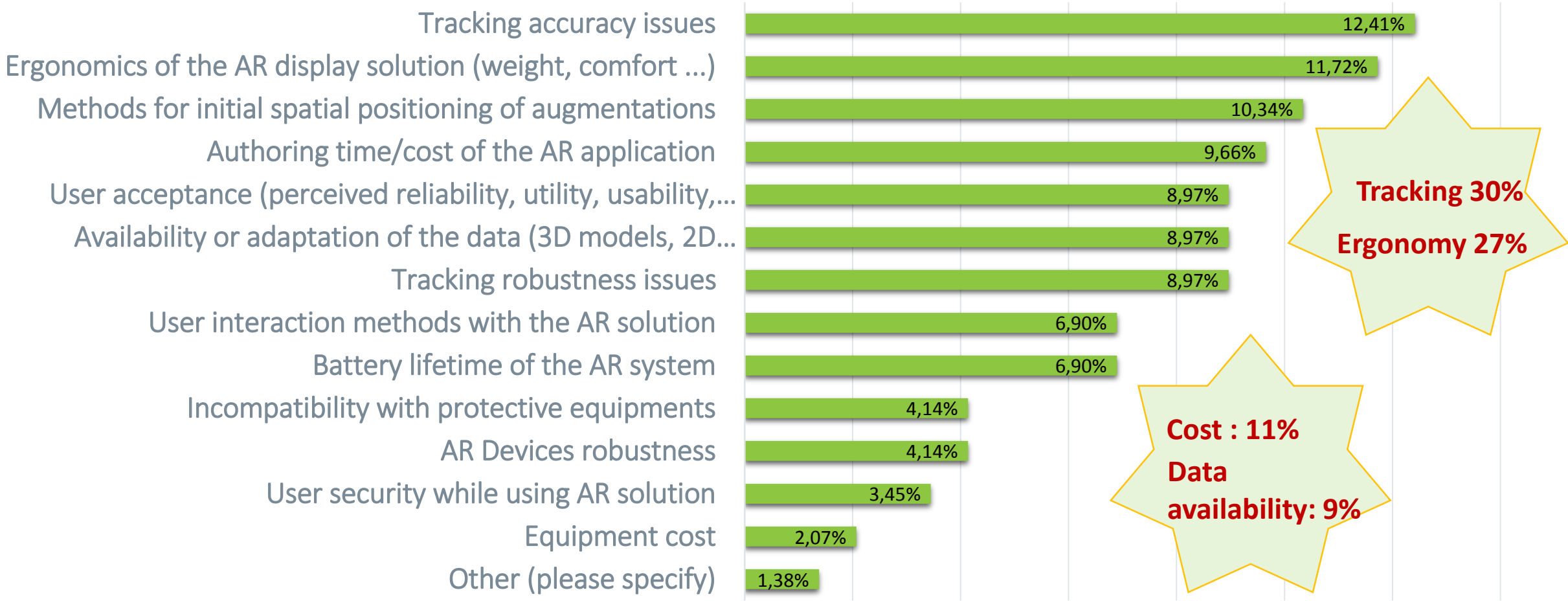

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Interoperability Requirements for AR

- A group specification **specifying requirements for the interoperability of AR components, systems and services**
  - Will build on industrial use cases identified in previous group report
- **Rapporteur:** Eric Villain, Orange
- Work at an early stage

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Benefits to the ecosystem and outlook

- **A reference interoperability framework for AR components and services** taking into account existing AR models and compliant with relevant AR specifications
- Availability of high performance AR components **portable** between different hardware vendors, different providers of software solutions and platforms
- AR services and platforms **simpler to design, deploy and operate**
- **Incremental migration of AR components to the edge** starting with storage in the cloud all the way to remote rendering of complex scenes and other functions e.g. relocalisation where latency is critical.

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Why are we doing that ?

- **No solution fits all requirements !**
  - Custom development is essential to meet the needs of industry 4.0 (and others)
  - Being able to play Lego™ with AR components is crucial for AR deployment and adoption.
- **Prevent lock-in situation with a single vendor**
  - Swap easily technologies, e.g. improve applications performance and services
  - Improve confidence to invest in and use AR solutions
  - encourage an ecosystem with a diverse range of solution providers including smaller players, new entrants and academics

If you share this vision, join the ISG ARF !

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Do get involved!

- ToR : Terms of Reference
- If your company is an ETSI member, you can join the ISG ARF after signing the ARF member agreement; no additional cost
- If your company is not an ETSI member, you can participate after signing the ARF participant agreement
  - Participation to online conference calls and subscription to mailing list are free
  - A fee of 200€ per day per physical meeting (F2F/online participation) per delegate; (capped to 700€)

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ISG ARF Management Team

- **Chair:** Ms. Muriel Deschanel, muriel.deschanel@b-com.com
- **Vice-chair:** Dr. Ralf Schäfer, ralf.schaefer@hhi.fraunhofer.de
- **Secretary:** Nicole Leminous, nicole.leminous@orange.com
- **Technical Officer:** Sylwia Korycinska, Sylwia.korycinska@etsi.org
- **Rapporteurs** for:
  - AR standards landscape report: Marius Preda, marius.preda@it-sudparis.eu
  - Industrial use cases for AR applications and services report: Dr. Ralf Schäfer, ralf.schaefer@hhi.fraunhofer.de
  - AR framework architecture specification: Jérôme Royan, jerome.royan@b-com.com
  - AR interoperability requirements specification: Eric Villain, eric.villain@orange.com

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THANK YOU!

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