

Towards Standardization for Mapping Indoor Environment

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Abstract:

The creation of maps of indoor spaces and environments is becoming increasingly important. In the past, people spent most of their time outdoors, where one of their main challenges was orientation and finding their way. Maps, both topographic and thematic, were therefore an important source of information that helped them make appropriate decisions in space. Today, an increasing number of human activities take place indoors. These are no longer just homes or workplaces, where we are familiar with the environment and can easily find our way around, but also large indoor spaces such as indoor sport arenas, shopping centers, parking garages, educational institutions, administrative buildings, and cultural institutions.

Furthermore, outdoor navigation today is largely supported by navigation devices that combine digital maps with GNSS positioning services. Indoors, these systems mostly fail due to limited access to the GNSS signal. For all these reasons, we still need appropriate maps for successful indoor navigation. In the past, highly schematic representations were mostly used—sometimes simplified architectural plans—which were either too vague or too detailed; above all, they were not standardized in depicting the characteristic challenges of multi-story environments and were not tailored to users.

The idea of standardizing indoor maps for orientation purposes stems from experience in the orienteering sport. Orienteering maps, optimized for fast and efficient navigation across various types of terrain, are the most standardized maps in the world to ensure the fairness of competitions at the international level. The first version of the International Specification for Orienteering Maps (ISOM) was published in 1975, followed by four updated versions, the latest from 2017 with the most recent revisions from 2024 (Petrovič 2024, 2025). Additional specifications have also been added for maps used in ski orienteering, mountain bike orienteering, and (primarily) urban sprint orienteering. In recent years, as indoor orienteering has become increasingly popular—typically in complex, publicly accessible multi-story buildings, like indoor sport arenas—a need has arisen for guidelines for mapping indoor spaces. The IOF Maps Commission therefore published the first draft of the specification for indoor orienteering maps in 2025 (Figure 1). Since then, the proposed contextual solutions for map design have been tested at numerous local competitions. Based on the experience gained, version 6.6 is currently undergoing user evaluation (IOF MC 2026). Most of the issues that differ significantly from traditional mapping focus on the separate representation of each level, the clear display of connections between levels, and the highlighting of all potentially hazardous objects.

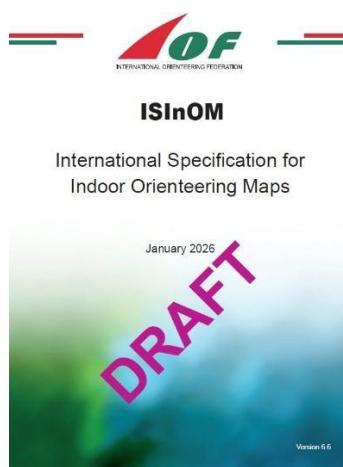


Figure 1. Cover page of current version of draft of ISInOM – International Specification for Indoor Orienteering Maps.

The presentation will introduce a concept for indoor maps that takes into account all the specific features of multi-story built environments and is primarily intended for indoor navigation. If adopted and implemented, the proposed solutions could serve as a welcome guideline for designing indoor maps for various purposes and for potential future international specifications.

Acknowledgements

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References

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