Technology in Orienteering – IOF IT Commission Open Meeting

The IOF IT Commission is pleased to invite all technology-inclined orientees to an open on-line meeting

Sunday, 9 November, 2025, 19:00 - 21:30 CET

The format will be short presentations on different topics related to technology. The focus will be on the technology related considerations and challenges that face developers of technology for orienteering, and how these challenges are solved.

The meeting will be held on-line using Microsoft Teams. To participate, please use this link to register in advance:

https://events.teams.microsoft.com/event/4c50b2eb-9140-4efe-a28e-718626dd4d59@a9dcd984-57e3-45e0-aca0-9bbe4d0a2c8b

Once registered, you will receive an e-mail with a link to the on-line meeting.

12 minutes is allocated to each presentation. After each presentation, there will be a short window for questions.

Your microphone and camera will be off during the meeting, and you will be able to use the *Questions & Answers (Q&A)* channel to ask questions. The moderator will monitor the Q&A channel and relay as many questions as possible to the presenter.

The meeting will be recorded, and the recording will be made available on-line after the meeting.

We are looking forward to seeing you at the meeting.

Los Angeles Sun 10:00	New York Sun 13:00	Rio de Janeiro Sun 15:00	London Sun 18:00	Oslo Sun 19:00
Munich Sun 19:00	Stockholm Sun 19:00	Helsinki Sun 20:00	Kyiv Sun 20:00	Jakarta Mon 01:00
Hong Kong Mon 02:00	Perth Mon 02:00	Beijing Mon 02:00	Tokyo Mon 03:00	Sydney Mon 05:00

Programme

The technology behind broadcast and streaming from IOF major events
Per Frost, Event Presentation Manager, IOF, Sweden

From zero to the big screen - How to DIY orienteering broadcast.
William Hollowell, OK Tyr, Sweden

Double Diamond approach to orienteering product development - user research in practice
Fryderyk Pryjma, CEO effde, Poland

A holistic approach to event organisation
Burkhard Ritter, Managing Director, SPORTtIdent, Germany

The IOF Data Standard – upcoming revision project
Edoardo Tona, IOF IT Commission

Short break

Lessons from the Forest: 25 Years of Radio Control Deployment in Orienteering
Ian Marsden, Director GPProjects, CTO Eseye, United Kingdom

A new punching system
Chuan Lian, HuiChang, China

A Sub-GHz Mesh Radio System for Reliable Orienteering Punching and Tracking: Technical Challenges and Design Decisions
Tate Needham, CEO meshO, Australia

What does it take to make a multi-platform mapping app?
Alistair Landels, OCAD, Switzerland

Training with Virtual Checkpoints in Forest
Guntis Šmaukstelis, Latvia

Presentation Abstracts

The technology behind broadcast and streaming from IOF major events

Per Frost, Event Presentation Manager, IOF, Sweden

Per Frost is the IOF Event Presentation Manager and has over 15 years of experience in streaming orienteering. The session will include an overview of the basic elements of a successful live stream or broadcast. Compared to many other sports, orienteering by its nature presents producers with many challenges, both in terms of technical operations and in how to present a complex sport in an understandable and entertaining way. Recent decades have brought new technical tools that have revolutionized the broadcasting of our sport, and we will also look at what the future may bring.

From zero to the big screen - How to DIY orienteering broadcast.

William Hollowell, OK Tyr, Sweden

Follow along on the journey of OK Tyr the Swedish club that started dipping their toe into broadcasting orienteering. From a simple mobile phone setup to big screen production at the Swedish Championships. What they failed at and learned along the way.

The IOF Data Standard – upcoming revision project

Edoardo Tona, IOF IT Commission

The IOF ITC publishes an XML format for data interchange between orienteering applications. The current version 3.0 from 2012 is now 13 years old, and it is time to consider if a new version is needed, and whether an incremental version 3.1 or a major revision 4.0 is the way ahead. Edoardo will present the project.

Double Diamond approach to orienteering product development - user research in practice

Fryderyk Pryjma, CEO effde, Poland

This talk applies the Double Diamond (discover, define, develop, deliver) to orienteering. I will focus on discovery and definition, using event ride-alongs, short post-finish interviews, and simple assumption mapping to isolate the problems that matter under real constraints. In development and delivery, we validate one concept at a time with prototypes. I'll connect this to market-pull examples from other spaces.

This talk is aimed at both change-makers willing to create new solutions for Orienteering and curious about how to get an idea of what the user wants and also at digital product owners who want to further improve their products.

A holistic approach to event organisation

Burkhard Ritter, Managing Director, SPORTtIdent, Germany

The process of organising orienteering events has not seen disruptive changes over the last decade or two. While there have been significant improvements in the area of live results and tracking, other areas have remained virtually unchanged. At the same time, athletes' expectations have evolved as the world has moved into a more connected and digitalised era.

For organisers, volunteer recruitment and athlete safety are among the concerns that have grown in importance. We would like to use this presentation to explore some ideas and discuss with you what an improved organising experience could look like.

These ideas include modern software solutions that span from mobile devices to the cloud, more connected hardware, as well as self-service options for athletes such as readout terminals. We will explore whether there are opportunities for new services such as volunteer management.

In short, would a more holistic approach for organising orienteering events across hardware, software and services add value for organisers and move the sport forward?

Lessons from the Forest: 25 Years of Radio Control Deployment in Orienteering

Ian Marsden, Director GPProjects, CTO Eseye, United Kingdom

GPProjects has been producing radio controls for orienteering for over 25 years and is pleased to share insights from our journey.

Over this time, radio controls have transformed the landscape of orienteering from rudimentary packet radios to sophisticated LTE-enabled systems offering perfect accuracy and sub-second latency. Today, they are used not only for safety reporting and mid-week training but also in major events such as the World Orienteering Championships (WOC), supporting live broadcasts.

We will explore forest-side deployment, where environmental conditions demand high reliability and ease of setup. The system must work straight out of the box and be simple enough for a control hanger to deploy confidently.

We will also demystify cloud servers, explaining why mobile networks and NAT (Network Address Translation) make them essential. Topics will include standards-based protocol selection and, crucially, security considerations.

Finally, we will examine how data is presented to results software, focusing on minimizing latency while ensuring data integrity.

In conclusion, we will summarize the current state of radio control technology in the UK and share perspectives on future developments.

A new punching system

Chuan Lian, HuiChang, China

In the Spring 2025, the IOF issued a provisional approval for a new punching system, called HuiChang. For this presentation, we plan to give a report on some unique features and new research of our equipment. We plan to present the following content：

Hardware considerations: Smaller volume and lighter weight; Touch-free card provides more noticeable feedback, including vibration; The device uses charging mode without the need for battery replacement; Flexible unit functions; Contact based full range punch design.

Software considerations: Convenient results statistics software; The device is open for compatible use with various software; Research and development for young children; Research and development of artificial intelligence orienteering

A Sub-GHz Mesh Radio System for Reliable Orienteering Punching and Tracking: Technical Challenges and Design Decisions

Tate Needham, CEO meshO, Australia

Cellular coverage at orienteering events is unreliable at best, and expensive in terms of SIM subscription per node. To enable real-time punch tracking and GPS positioning independent of infrastructure, meshO developed a sub-GHz mesh radio system designed specifically for orienteering terrain.

We chose sub-GHz over 2.4GHz for superior propagation through vegetation and terrain features. Extensive field testing across diverse landscapes (from open eucalypt to dense forest) quantified real-world performance. Dense vegetation had the most significant impact on range. We systematically tested antenna configurations: height, orientation, size, and gain to optimize the trade-off between signal strength and throughput at distance.

Power efficiency was critical. The radios dominate power consumption, so we selected STM32U5 microprocessors (running at 24MHz) for their exceptional power efficiency while maintaining processing speed after evaluating other microprocessors.

The firmware runs FreeRTOS (a Real Time Operating System for microprocessors) with multithreading: concurrent handling of punch reception, network transmission queuing

and retries, status requests (battery, temperature, etc), and GPS interfacing. This architecture ensures low-latency punch processing and robust network behavior under varying loads. We had 3 complete re-writes of the firmware as we learnt the limitations and fine tuned the requirements. All the previous versions weren't using a RTOS - the big lesson here was that as the complexity grew the code became too hard to maintain. An important design constraint was that the system shouldn't lose any punches, so the firmware has to cope with storing big array of punches if the network is not up, congested or temporary connectivity issues, ensuring successful transmission via acknowledgment all while achieving 24+ hour battery life.

Physical packaging required extensive iteration: waterproof enclosures, external activation, magnetic charging, battery placement, PCB layout, and antenna positioning to achieve a compact, durable unit that survives real orienteering conditions.

This presentation covers our technical decisions, testing methodologies, deployment lessons from Australian state and national events, and ongoing development of the GPS tracking device.

What does it take to make a multi-platform mapping app?

Alistair Landels, OCAD, Switzerland

To take the successful proof-of-concept OCAD Sketch App and improve on it, requirements:

Run on iOS, Android, Windows & MacOS in environments with input methods including fingers, stylus, mouse and often no keyboard. Use one code base across all platforms while utilizing native device performance.

Be used in the field and integrate with inbuilt and external compass and GPS technologies. Can work completely offline including being able to synchronize data with OCAD Desktop without an internet connection. Can be used to edit parts of maps, by many users, who may have many devices. The users can submit changes that can be merged easily into one map file on OCAD lDesktop.

Edit vectorized map-objects with complex 2-D geometries. Be performant in presenting data containing thousands of objects when zooming in and out rapidly. Can display layered raster data such as aerial photographs. Ability to adjust opacity and use transparency for all layers.

Save data immediately, often in large and complex transactions with undo/redo functionality. Provide an intuitive contextual configurable user interface so users with small devices can be productive.

Training with Virtual Checkpoints in Forest

Guntis Šmaukstelis, Latvia

This presentation introduces OrientMap, a Garmin watch application that enables orienteers to train with virtual control points without physical controls. The system operates offline, downloading maps via WiFi for local storage and providing audio feedback when virtual checkpoints are captured through button activation.

OrientMap uses standard orienteering formats including OCAD exports (.tfw/.jgw) and CourseData XML. Input file integration exists with web platform unlost.club, but other endpoints can be added as well. After training, the application generates a standard .gpx file compatible with Strava and analysis tools such as Livelox.

The system provides multiple training modes, including orienteering map display directly on the watch interface - a feature not available in existing solutions like MapRunG and O-range. This allows orienteers to get immediate feedback on mistakes made. Other modes like sound-only feedback (similar to SIAC) can also be used.

Future development will focus on expanding device compatibility with other watch brands and integration with analysis tools for automated training data synchronization, supporting the orienteering training ecosystem.