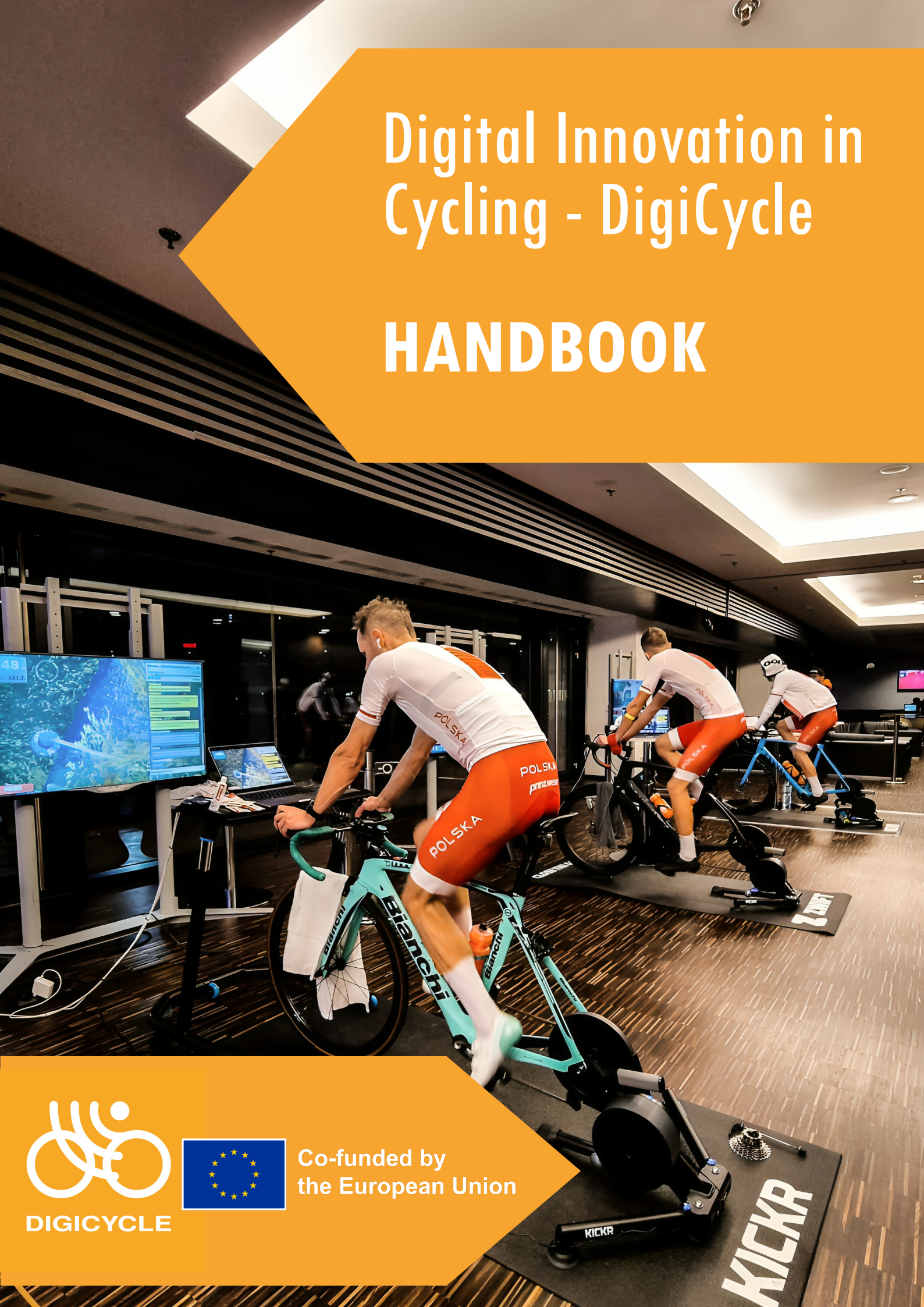
Digital Innovation in Cycling - DigiCycle

HANDBOOK



DIGICYCLE

Co-funded by
the European Union

HANDBOOK

Digital Innovation in Cycling

Project Information

DigiCycle is a two-year project co-funded by the European Commission's Erasmus+ Sport Call 2021, under the Cooperation Partnerships programme, with the ID 101050164.

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Project Consortium

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Polish Cycling Foundation

German Cycling Federation

Danish Cycling Federation

European Network for Innovation and Knowledge

Royal Spanish Cycling Federation

European Cycling Union

What is ECycling?

1.1. Description of the project

The "Digital innovation in cycling – DigiCycle" project is an initiative of the Polish Cycling Support Foundation that has been developed under the Erasmus+ program and supported by the European Union. Some of the main european national cycling federations have joined in, such as the Danish, German and Spanish, as well as the European Cycling Union and the Dutch Think Tank EUNIK.

The main objective of this project is to popularize the use of bicycles among the population through virtual cycling and digital innovation. The pandemic, as well as the evolution of society itself, has redirected leisure towards the internet and electronic devices, where e-sports have stood out notably. From this project, we believe that with the help of new technologies, a broad group of society can be encouraged to practice cycling, from young people to the elderly, including sectors of the population less represented in our sport. In addition, virtual cycling is suitable for everyone regardless of their fitness level and can give each practitioner a notable impact on their physical and mental health.

This initiative will try, through sports organizations at various levels such as the European Cycling Union, national federations and sports clubs, to promote the use of virtual cycling simulators to promote our sport. The different partners involved in the development of this project will create a roadmap for national cycling federations in Europe, facilitating the implementation of the Zwift platform as a tool to promote cycling and increase physical activity among different social groups.

The partners of this project have worked together to develop this manual that will serve as a guide for other sports organizations to promote e-cycling.

1.2. Advantages

The appearance in recent years of Zwift, as well as other platforms that offer a similar service, have allowed the interest and attractiveness of indoor cycling to be taken to the next level.

To practice virtual cycling we will need a smart trainer that can connect to a computer, tablet or mobile phone and on this device we will run the Zwift software or another similar app. The entertainment offered by this type of platforms such as Zwift allows virtual cycling to provide a much more realistic user experience than any other e-sport discipline. Virtual cycling will allow us to immerse ourselves in an online cycling competition in which we will face riders from anywhere in the world and where each person's strength will decide who is the winner. Therefore, in addition to the entertainment that all e-sports provide, in the case of e-cycling we can improve our health and mental well-being, as well as develop good physical fitness.

All these features make virtual cycling an unbeatable gateway to our sport for the younger population, as well as for people who may be starting out on the bicycle or for others who want to return to healthy sports practice at older ages.

1.3. How it influences cycling

Virtual cycling has not only become an alternative for leisure and training for many people, but it has also gained its own identity, since the International Cycling Union recognizes it as another discipline in its statutes (article 2-L of chapter 1), as well as the majority of national federations.

Its rise has led to the UCI Cycling e-Sports World Championship being held since 2020, which has allowed several riders to make the leap from 'the roller' to professional road cycling. A demonstration that virtual cycling is an excellent way to train and maximize performance.

Virtual cycling has clear advantages over other forms of cycling, since it eliminates the interruptions and inconveniences that occur when riding outdoors, since you can be 100% focused on your effort and do it continuously and without alterations due to traffic lights, intersections or sections where you cannot pedal. It is also an extraordinarily useful tool for those who have little time or have schedules that prevent them from going out to ride when there is still sunlight. In many cases, an hour of roller, doing a few series, is more than enough to complete a quality training that allows us to improve our performance. These indoor cycling sessions are usually characterized by being high intensity, so when carrying them out we must take into account the following issues:

- Indoor cycling places special emphasis on intensity and not quantity, so do not train every day on the roller.
- Allow yourself days of recovery between virtual cycling sessions and if you want to do some activity on those rest days, opt for gentle and regenerative sessions.
- For most cyclists, doing two quality training sessions a week through e-cycling combined with some long-distance sessions on the road or on the mountain bike will be enough to experience significant improvements in performance.
- If you already have a high level of fitness, you can continue improving your condition by doing interval training or series of 20-second sprints with 40 seconds of recovery, among many other proposals.

1.4. Zwift intro, and other games

Virtual cycling platforms were developed in the early 2000s, but it has actually been in recent years that they have experienced a true revolution. The pandemic popularized its use throughout the world and the wide variety of alternatives they offer - competitions against riders from all over the world, organizing your own training or riding alone on some mythical routes - have allowed virtual cycling to consolidate itself as a modality.

Zwift has become the reference platform within virtual cycling simulators thanks to the brilliant experience they provide to the user. It is a platform focused on building large communities bringing together people from all over the world who can integrate during joint rides, training or races.

The result of all this is that Zwift currently has more than two and a half million users from 190 countries around the world.

When it comes to using Zwift, it should be noted that it is quite simple. In addition to having a PC, Mac, Smartphone or Tablet, you only need to have a smart trainer to which the application will automatically connect using Bluetooth or ANT+ to simulate the terrain and adjust the resistance of structured workouts.

In addition to Zwift, there are several platforms that offer similar services, although each of them has a series of features that make them different and special:

- Bkool: was one of the pioneering software in terms of virtual reality applied to cycling. It offers the possibility of taking endless routes and legendary ascents of this sport and recreating them from your home meter by meter. In addition, you can choose between real, 3D or map video sessions and, like in the rest of the applications, you can compete and participate in leagues against users from all over the world. It also offers the option to simulate riding in a velodrome.
- RGT Cycling: it is an application similar to Bkool, with great graphics, but with a smaller number of routes. Allows you to upload a GPX file of less than 100 km and the app will create a virtual route.
- Rouvy: offers functionality similar to the previous ones that will allow the user to train on legendary climbs and compete in a multitude of events with prizes. Route videos are offered in 4K quality and you can upload your own routes by synchronizing videos and GPS data with Rouvy Editor.
- MyWhoosh: it is an application very oriented towards virtual competition and training and has the advantage of being free, unlike the rest of its competitors. MyWhoosh makes different 3D virtual worlds available to the user and will be the application that will be used to compete in the next UCI Cycling e-Sports World Championship in 2024, 2025 and 2026.

Zwift

Required hardware

2.1. Space and Setup

Set up your indoor cycling area in a room that provides ample space and comfort. Ensure proper ventilation and that your bike or Smart Trainer is positioned securely and safely.

Here is an overview of the most important factors to consider:

- Adequate Space: To set up an ideal space for Zwift, ensure you have enough room to comfortably accommodate your indoor cycling setup. This includes space for your bike or smart trainer, as well as your own movement. Having ample space prevents a cramped feeling during your workouts and allows for safe dismounting and mounting.
- Ventilation: Proper ventilation in your training area is essential. Indoor cycling generates heat, and you'll likely sweat during your workouts. Adequate ventilation helps dissipate heat and keeps the room from becoming stuffy. It also enhances your comfort and helps regulate your body temperature.
- Stability and Safety: Ensure that your bike or smart trainer is positioned on a stable surface. It should be level and secure to prevent any wobbling or shifting during intense efforts. A stable setup contributes to safety and ensures a consistent riding experience.
- Screen Placement: Depending on your chosen device (computer, TV, tablet, etc.), ensure it's positioned at a suitable height and angle for easy visibility while riding. You should be able to comfortably view your Zwift interface without straining your neck or eyes.
- Access to Power Outlets: If you're using a device that requires power, ensure that you have access to nearby power outlets. This is important for keeping your device charged during your workouts, preventing interruptions due to low battery.

- Cleanliness and Organization: Keeping your training area clean and organized enhances your overall experience. It's advisable to declutter the space and remove any potential hazards or obstacles that could interfere with your workout.

2.2. Traditional trainer, Smart Trainer or Smart Bike

Choice of hardware is the key to participating in Zwift.

It is recommend to use a Smart Trainer or a Smart Bike because it offers a more realistic riding experience and can transmit real-time performance data such as power, resistance and speed. A Smart Bike simulates inclines and descents, making the Zwift experience even more realistic.

If you have a conventional bike trainer, you can still use it, but you'll need sensors for speed and cadence measurement.

- Bicycle with traditional trainer: You can use your own outdoor bike on an indoor trainer or rollers, allowing you to ride in the virtual Zwift world. Make sure your bike is clean and well-maintained before setting it up on the trainer. You can use road, triathlon, gravel and mountain bikes for riding on Zwift platform.

- Bicycle with Smart Trainer: A smart trainer is a specialized piece of equipment designed for indoor cycling and is an excellent choice for Zwift. It provides several advantages:
    - Realistic Riding Experience: Smart trainers can simulate changes in resistance to match the terrain in Zwift. When you go uphill in the game, the trainer increases resistance, making it harder to pedal, and vice versa for descents. This creates a highly immersive and realistic experience.
    - Power Measurement: Smart trainers measure your power output accurately, giving you precise data on your performance. This data is crucial for structured training sessions, races, and tracking your progress.
    - Connectivity: Smart trainers can connect to Zwift wirelessly, usually via Bluetooth or ANT+ technology, making setup easy and allowing you to control the trainer's resistance within the game.
    - Interactive Training: Some smart trainers are interactive and can adjust resistance in real time based on the virtual terrain, adding a dynamic and challenging element to your rides.
- All-in-One Smart Bikes: In addition to traditional bicycles and smart trainers, there are also "All-in-One Smart Bikes" designed specifically for virtual cycling. These bikes integrate a smart trainer, power meter, and bike frame into a single unit. They offer a compact and streamlined solution for Zwift. All-in-One Smart Bikes are known for their ease of use and realistic riding experience.

2.3. Device

Zwift is available on various platforms, including computers, tablets, digital media players and smartphones. The choice of device depends on your personal preferences and availability.

Here are the main options:

- Computer (PC or Mac): Zwift can be run on a standard PC or Mac computer. It offers a large screen for an immersive experience. You'll need a compatible graphics card and sufficient processing power to ensure smooth gameplay. An overview of the minimum requirements can be found at https://tinyurl.com/Zwift-Supported-Devices.
- Smartphones and Tablets: Zwift has mobile apps available for both iOS and Android devices. This allows you to use your smartphone or tablet as the primary display, making it a portable and cost-effective option. The Zwift mobile app pairs with your sensors (e.g., heart rate monitor, speed/cadence sensor) and can be cast to a larger screen for a better view.
- Smart TV: Some Smart TVs have the Zwift app available for download. This is a convenient option if you prefer a big screen and have a Smart TV that supports Zwift.
- Apple TV: Apple TV is another option. You can download the Zwift app on Apple TV and connect it to your TV for a great visual experience. Apple TV supports Bluetooth connectivity for your sensors.

<u>Combination Possibilities:</u>

- Computer + Smartphone/Tablet: You can run Zwift on your computer and use your smartphone or tablet as a secondary screen to display additional information or the Zwift Companion app for added functionality.
- Smart TV + Smartphone/Tablet: If your Smart TV supports Zwift, you can cast the Zwift app from your smartphone or tablet to the TV for a larger display.
- Apple TV + Smartphone/Tablet: Use your smartphone or tablet to control Zwift while it's running on Apple TV. You get the benefit of a big screen with the convenience of touch controls.
- Computer + Smartphone/Tablet + TV: You can connect Zwift to your computer, use a smartphone or tablet for additional information, and also cast the display to a larger TV for a comprehensive setup.

A reliable and fast internet connection is crucial for enjoying Zwift without interruptions. An

internet connection with a bandwidth of at least 3 Mbps or higher and latency under 50 ms is recommended to ensure a smooth riding experience.

2.4. Internet Connection

While Wi-Fi is convenient, a wired internet connection (Ethernet) is generally more stable and reliable. If possible, consider connecting your Zwift device directly to your router with an Ethernet cable to reduce the risk of Wi-Fi interference or signal fluctuations.

2.5. Sensors and Accessories

Using heart rate monitors, powermeters and speed and cadence sensors can significantly enhance your training experience by providing precise performance data.

If you're using a Smart Trainer, performance data is automatically captured. An exception is the "Dual Recording of Power Measurement," which is required for certain highly competitive events.

If you're riding on a Bike Trainer, you'll need a sensor for speed and cadence measurement to use Zwift.

Sensors to use:

- Heart Rate Monitor (HRM): A heart rate monitor tracks your heart rate, providing valuable data about your effort and intensity. It helps you stay in your desired training zones and is vital for structured workouts in Zwift.
- Power Meter: A power meter is one of the most advanced sensors. It measures the actual power output you generate while cycling. This data is highly accurate and essential for structured training and races in Zwift. It allows for precise wattage-based workouts and ensures a realistic experience.
- Speed Sensor*: A speed sensor measures your cycling speed. It's especially useful if you're using a basic trainer or rollers without a power meter. It helps Zwift calculate your virtual speed based on your real-world speed.
- Cadence Sensor*: A cadence sensor measures your pedal stroke rate, indicating how fast you're pedaling. It helps you maintain an optimal pedaling rhythm and can be crucial for training. Zwift can display your cadence in the game.

*mandatory when not using a Smart Trainer or an All-in-One Bike.

2.6. Recommended Accessories

- Table and/ or Device Holder: A table or device holder is essential for placing your device, such as a smartphone or tablet, in a convenient position for easy interaction with Zwift. It allows you to view your progress, change settings, and engage with the Zwift Companion app if necessary. Having a designated place for your device ensures that it's within reach and view without interrupting your workout.
- Water Bottle: Staying properly hydrated is crucial during your training sessions. A water bottle is an essential accessory as it allows you to replenish lost fluids, maintain your energy levels, and prevent dehydration. Being able to reach for your water bottle without leaving your trainer keeps your training uninterrupted and comfortable.
- Towel and/or Sweatband: Sweating is a natural part of intense exercise, and it can make your session less comfortable if not managed. A towel or sweatband serves the purpose of wiping away sweat from your face and body, ensuring that it doesn't become a distraction. It helps you maintain focus and comfort during your workout.
- Training Mat: Placing a training mat under your equipment is a practical choice. It not only protects your floor from the wear and tear of your workout but also prevents any damage or marks caused by your bike or trainer. Additionally, it can help dampen noise and vibrations, making your indoor cycling sessions quieter and more comfortable.
- Fan: Staying cool during indoor training is important. A fan helps regulate your body temperature by providing airflow, reducing excessive sweating, and preventing overheating. This contributes to a more pleasant and efficient workout. A fan can also simulate the natural breeze you'd experience when riding outdoors.

An overview of the required equipment can also be found at https://tinyurl.com/Zwift-What-you-need-to-ride.

Optional Accessories

- Headphones: For a more immersive gaming experience, communication, and listening to music, podcasts, or similar content during your workout.
- Climbing Simulator: A climbing simulator can provide an even more realistic gaming experience by simulating inclines and descents, making your training sessions more challenging.

2.7. Zwift Membership

For full access to all features and routes, you need an active Zwift membership. Note that a monthly fee applies for membership. Currently, this fee is $14.99, plus any applicable sales or local taxes, depending on your region.

Children and adolescents under 16 years old can register for a free membership at https://www.zwift.com/kids.

Zwift

3.1 Zwift as a training platform

Zwift is the leading platform for e-cycling. The platform blends gaming and exercise, which could be the explanation for the increasing surge in users every winter season. For many recreational riders and pro cyclists, the Zwift platform offers a unique alternative to battling the cold winter months outside and thus gives the riders a possibility to maintain (or even increase) fitness in the winter months. Zwift is under constant development and currently works as any other video game with a huge variety of features and experiences for its users. Zwift offers an opportunity for new riders to ease into the cycling world by adjusting the gaming experience to your current fitness level. This makes Zwift and e-cycling an ideal way for newcomers to the sport of cycling, to get a soft, easy and fun introduction to the sport. For experienced riders, Zwift offers many options to structure and improve your training, while also gamifying the competitive aspect of the sport.

Zwift works first and foremost as a simulation software. Meaning that when paired with a smart trainer, the rider can simulate riding a route, in a world that in synergy with the smart trainer gives you a feel of tackling climbs, road surfaces and much more. Zwift also has a unique gaming visual style, where you as a rider are not faced with video simulations of real-world routes. Instead, all routes are in a video game style aesthetic, which adds to the gaming experience of this software. You can ride alone or socially, online with other riders from all over the world.

To see more about what Zwift is, and how to ride on the platform watch this video by Zwift: https://www.zwift.com/ca/video/how-to-cycling/what-is-zwift-ride

3.2. Home screen and navigation

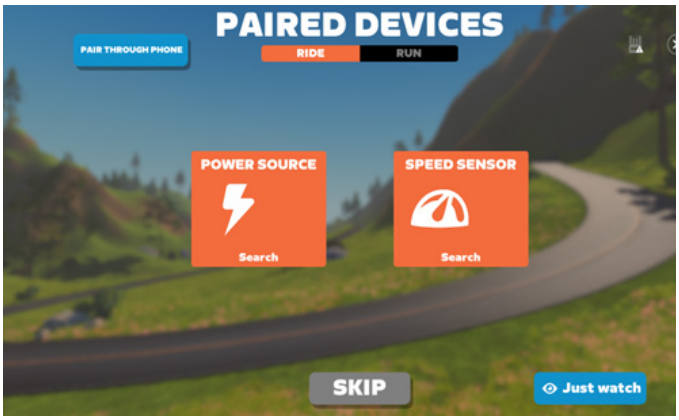
In this chapter we will go through the Zwift startup and menus and provide a thorough overview of what the user meets at any step. When launching the game, the user firstly must pair up external devices with the game. The game is only playable by pairing up these devices.

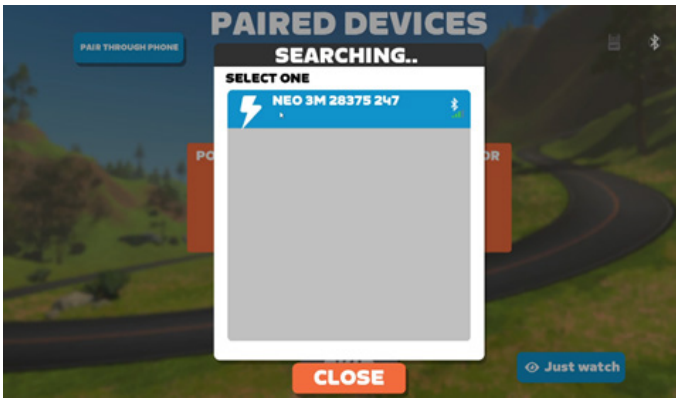
3.2.1 Pairing

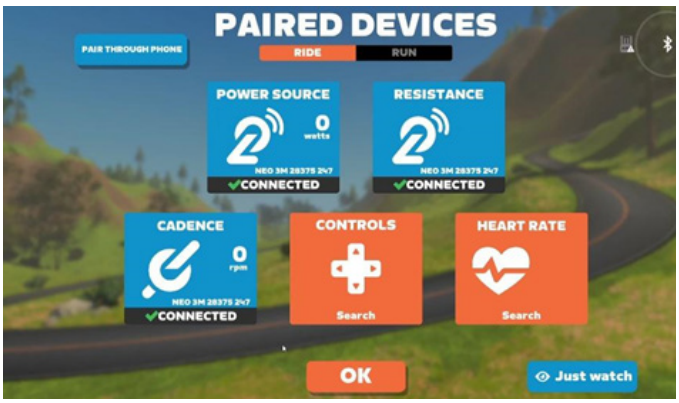
Watch the pairing video from Zwift: https://www.zwift.com/ca/video/how-to-cycling/pairing-smart-trainer

When opening Zwift, you will be automatically prompted with a screen for pairing devices with the platform. You can choose between a power source or a speed sensor. For the most acurrate and optimal experience with the platform, one should always go for a power source. An example of a power source could be a smart trainer or a power meter. However for optimal in-game simulation, it is preferable to choose a smart trainer, as it will also function as the resistance simulator. When pairing with a power source you can pair up to five different inputs:

- Power source
- Controllable (resistance & simulation)
- Cadence
- Controls (not essential for an optimal experience)
- Heartrate



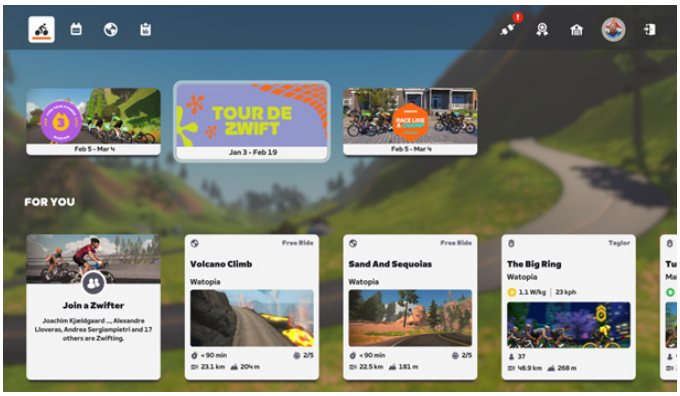


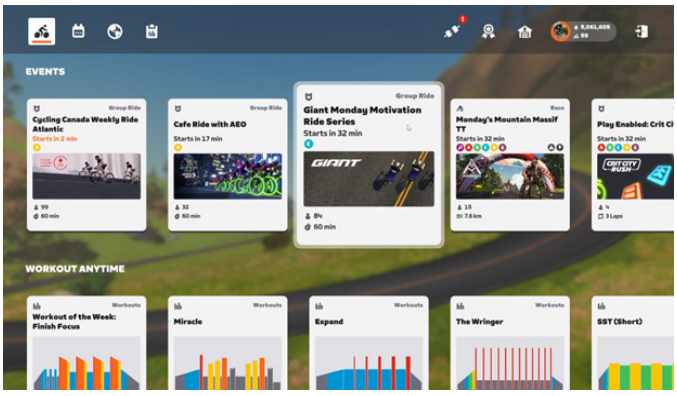


Bluetooth signal, directly from the devices to the platform or via a smartphone. You can also pair through ANT+ signal, which is a training device specific signal with no interference from Bluetooth. You will need an ANT+ antenna or dungle for your device to recieve the input, so most users would prefer using Bluetooth. The same device can be paired for multiple functions. It is perfectly normal to pair the same device for both power source, controllable and cadence (any smart trainer can output/input this).

3.2.2 Home Screen

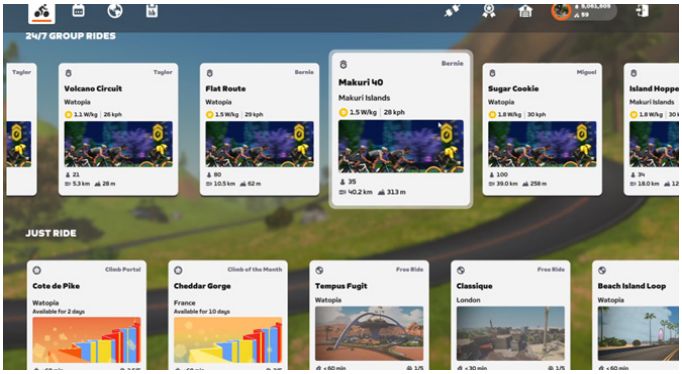
After the pairing is finished, you are taken to the main menu. This is the main hub, from where all your indoor cycling starts. From the top left corner of the screen you see four different tabs. The first tab is the main screen for picking your ride. On here you can join community events, such as Tour de Zwift. You can join another Zwifter, currently riding under the 'For You' section. Zwift also suggest a selection of possible "free rides" or pace partners according to your current level.





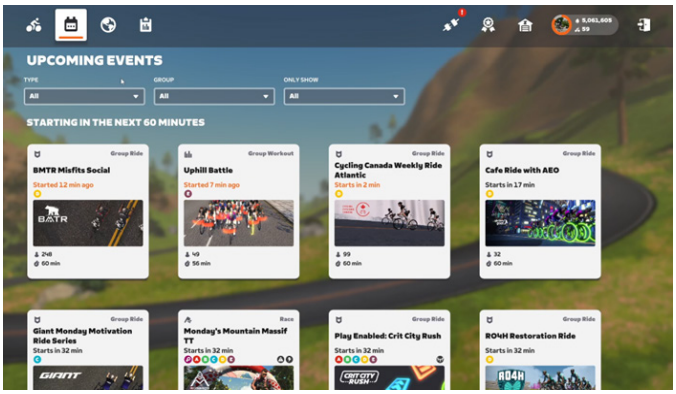
If you scroll down you will be met with the 'Events' section. In this section you can join an upcoming event. Events can be a race, group workout or a social ride. They are organized by a broad selection of verified Zwift organizers. Under the events section you see a section dedicated for 'Workouts'.

This section will suggest randomly selected workouts. A workout is a structured training session, where the rider will get an instruced training based on their power metrics.

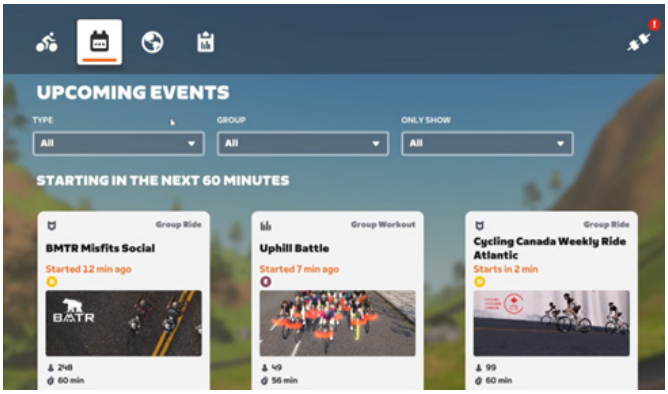


Scrolling further down you see the '24/7 Group Rides' section, which is a selection of all of Zwifts bot controlled pace partners. You can always join a pace partner according to the level you are looking for in a ride, and then follow along the pace from the in-game bot or the rest of the virtual group (of other online players). For example if you feel like riding at a pace of 1.5 watts per kilo, you can choose the 'Bernie' pace partner from this section and join a group ride, riding just that specific pace.

The final section is the 'Just Ride' section, which presents you with a small selection of routes to go directly into. From here you can also open the 'Routes' tab and choose any available route currently in the game.

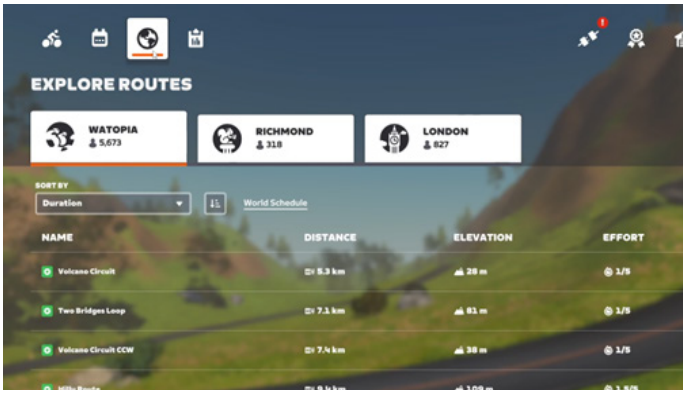


The second tab from the top left is the 'Events' tab. It ties into the events selection from the main screen but gives you, instead, a full list of upcoming events.



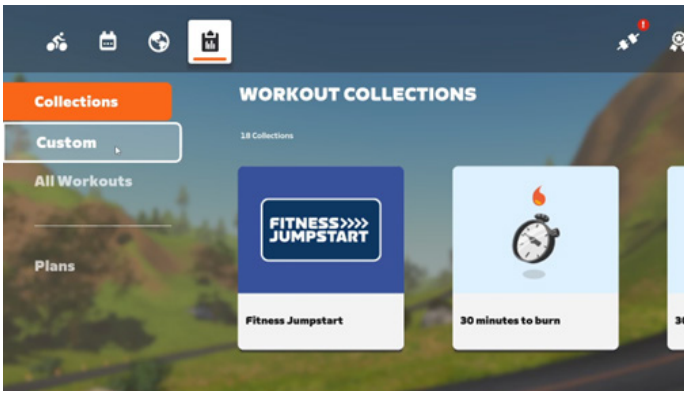
Here you can sort the events by type (for example: Race, Group Ride, Fondo or Group Workout). You also have the option to sort by ride group. Groups are an performance indexing option on Zwift, that divides all riders into categories based on their performance level. The top level is the A category and from there it goes A, B, C, D category. The E category is open for all and lastly there is a womens only category. You start of the game without an assigned category but after Zwift has enough data on your power metrics, performance and weight, the platform will automatically assign you a category and adjust it as you improve. This system assures that if you join a race or a group ride in your own category, you will only meet riders from the same performance category. This way you can race and train with riders on a similar level as you. The event tab will only show upcoming events for the next 60 minutes. For a more thorough list you can use either the https://www.zwift.com/ website or the Zwift Companion App.

The third tab is the 'Worlds' tab. Zwift has a wide selection of different worlds to visit. Watopia is the original and main world of the game.



Other worlds are also part of the game, for example 'France', 'Richmond', 'Makuri Islands' or 'Paris'. Each world has a selection of routes. You can always free ride in the world by using the in-game controls. If you do choose a route, your in-game avatar will automatically follow the route directions and after finishing the distance you will earn a 'badge'. For example if you choose 'Watopia' and the route, 'Volcano Circuit' you will join in on the 5,3km route and be able to ride and complete this specific route. You can always open a route and at any given minute steer off the route and free ride from here. The worlds are in a three option rotation, meaning that you only have the choice between three worlds everyday with 'Watopia' always being available. All the worlds have multiple routes and places to visit, so you are not missing out on riding options. You can find the daily selection of routes either from the 'Worlds' or by clicking the 'World Schedule' button from the tab. This will open a calendar showing what guest worlds will be avaiable at any given date.

The fourth and final tab is the 'Workout' tab.

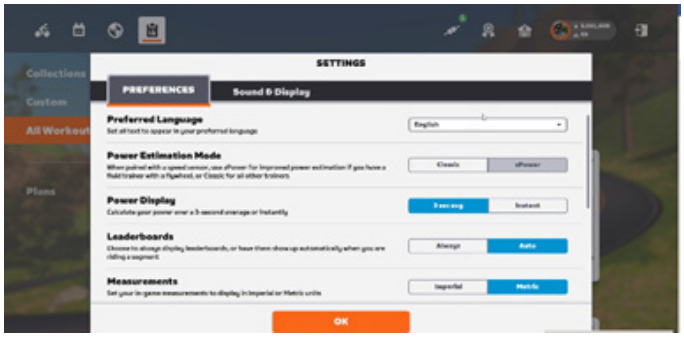


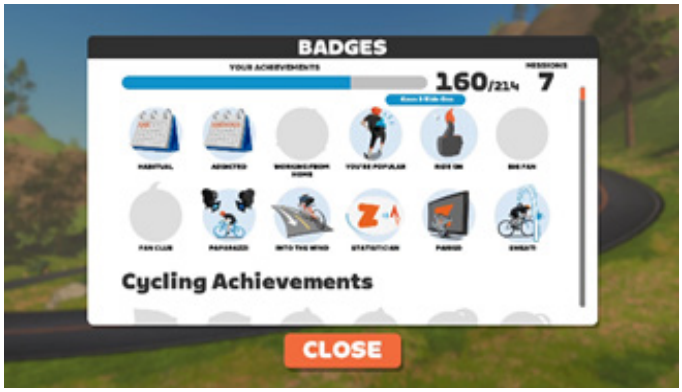
Workouts are sorted by 'collections'. The collections all have multiple different workouts to choose from, depending on your preferences. As an example you can open the '30 minutes to burn' workout tab and from here get a selection of pre-made workouts no longer than 30 minutes in duration. These workouts are a good way to get in a good structured training, where you as a rider, is guided through the different workout intervals. Workouts are a good way to use the game to build fitness and improve as a rider. When you get more experienced with this feature, you can build your own workouts from the 'custom' menu. If you choose a 'Plan' you will sign up for a structured workout plan ranging over multiple days, weeks or months.

For a visual guide, check out the 'How to train on Zwift' video by Zwift: https://www.youtube.com/watch?v=8IadUTU1Atc

3.2.3. Settings, Profile, Garage & Pairing tabs

In the top right corner of the screen you have the profile and settings tabs. From left to right, you first see the pairing tab, which will take you back to the pairing screen. The second tab is the 'Badges' tab, which gives you an overview of your in-game achievements i.e. how many route badges you have earned. These achievements work as a motivator for exploring or using all of the platforms different features. The third tab is the 'Garage'. The garage is your hub for desiging your in-game avatar and equipment. Lastly you can open your profile from the 'My profile' tab. From here you can change your name, weight, height, nationality or other important metrics. You can access the settings. You can ride the tutorial ride, which gives you a beginners introduction to the game. Or you can switch to the running mode.





3.2.4. My Garage

My Garage is the hub for changing the look of your in-game character. You have multiple options to change and adjust the look of your in-game avatar and bike:

- Frame (Your bike frame)
- Wheels (Your bike wheels)
- Me (Head, Body & Hair style of your avatar)
- Head Gear (Helmets, Caps or Hats)
- Glasses
- Jersey
- Gloves
- Socks
- Shoes

Any of these items are either unlocked through riding and earning in-game XP or bought with 'Drops' through the in-game 'Drop Shop'. Excluding the frame and wheels, all gear is earned by rising through the experience levels or participating in different events with unlockable gear.

The frame and wheels work for the most part a bit differently. It is possible to earn new gear by just riding, but for the most part you will have to upgrade this gear through 'buying' it via the in-game drop shop. The gear will have a performance impact in-game, which means that you must pay some attention to which bike frame or wheelset you are using.

3.2.5. The Drop Shop

The in-game drop shop is the place from where you buy either frames or wheels. You can only buy in-game gear with drops. Drops cannot be bought with money, they can only be earned by riding. The more you ride, the more drops you earn. When opening for example the frame section of the drop shop. You are presented with a list of different bike frame manufacturers. These are equivalent to real-world bike manufacturers. This means that the available gear is reflective of real bike manufacturer gear. Each frame or wheelset has its own attributes. These are indicated by a star system according to either the gears 'aero' or 'weight' attributes. Pay attention to these, when picking the gear for a specific route, event or race. For example if you are to ride an event with a lot of climbing, you can gain an advantage by choosing gear with a high star rating in weight, which means that the gear is as light as possible.

3.3. How to play

Zwift plays like an open world racing game. It combines cycling simulation and exploring, for the most part, atleast. When you have selected what to ride from the menu, you spawn into the world. Here you are presented with you avatar, on a virtual road in third person view. This view can ofcourse be changed, say you prefer riding in first person view (however, then you can't see yourself and the avatar you just created in My Garage). To play the game you have to pedal and ride your bike, which is connected to the smart trainer. When you pedal, you create power which the trainer (or your power meter) registers, and it makes you move in-game. How fast and how far you go is up to how hard you pedal and how long you can (or want to) go for. So to sum up, you play the game by riding your bike on a smart trainer in the real world, which is then mirrored in the virtual world of Zwift. Essentially your bike, your body and your smart trainer becomes the controller, as if you were playing on a playstation. The single most determining factor for your in-game speed, is your power to weight ratio. The power to weigh ratio, refered to as watts per kilo (w/kg), is a metric that uses the weight input you added to your profile and the power input provided by your pedalling. Power is measured in wattage. The higher wattage relative to your weight, the faster you will go. This is not the entirety of it, and is more true when climbing, than when going downhill or riding on the flat. On the flat the raw wattage power has more saying on your speed than the power to weight, while when going downhill the weight is the bigger factor. All these measurement metrics are put in place to mimick real world riding.

From here on it becomes a bit more complex, depending on how technical and specific the user wants to be. Which is why it can be a lot easier to just stick to riding in the beginning. Zwift is not only a game, but also a training tool and this means that data and overly technical understandings of how the game algorithm and how the game uses data, is more for the most serious athletes. For the beginner, the game is played the easiest when the focus is on moving forward. However, that still means a basic understanding of w/kg and their effects on speed is necessary. But in the most simple terms:

- To go forward – pedal
- To break or stop – stop pedalling

3.3.1. The HUD / Display

For a more detailed understanding of the in-game metrics and how they apply to your riding experience, first you must look at the interface. The rider is presented with a lot of different information. Lets start with the most important.

In the top left corner you see a blue box displaying the riders current wattage output (in raw watts), the RPM (pedal rotations per minute or cadence) and the riders heartrate in BPM (beats per minute). This is given that a device sending this data to Zwift was paired in the pairing screen. Next to the blue box, we see a circle, sometimes with a colored symbol inside. These indicate a power up, which is a gamifying feature of the game where a rider for a brief moment can activate an in-game super power (featherweight, aero, drafting and more). In the middle we see a large white box, which contains information on speed, ridden distance, accumulated altitude gain, ride time, current level, overall amount of drops and lastly the remaining time or distance of the current event or route. It is a lot of information, which the rider will get comfortable with, the more they use the game.

To the right is a map, which from an overhead position shows the riders current position. It has information on the current incline, and a route profile (showing incoming climbs and downhills). Below that is the list of nearby riders. The players own name is marked by a blue outline. The list shows current distance in both time and meters to the nearby riders. Probably the most important metric on the list is the current w/kg output from both the player and nearby players. This information gives an indication of how much harder the rider needs to pedal to stay with (or get away from) the other players.

The user interface when riding is, thus, filled with a lot of information. It will take time to get used to it, which could prompt new riders to solely focus on their avatar and the virtual sorroundings.

For a visual understanding of the HUD, see this video from Zwift: https://www.zwift.com/ca/video/how-to-cycling/how-to-read-the-heads-up-display-free-ride

3.3.2. Drafting & in-game dynamics

Every rider that sorrounds you in-game are all people on their own bikes, connected to zwift from somewhere around the world. So even though you might be sitting on your bike at home by yourself, you are virtually sorrouned by other people riding. If you want to ride together in a group, or follow along someone else riding, its good to get to know about the drafting aspect. Drafting lets you follow along other riders. By riding very closely with them you will gain the speed they're going at and automatically stick together.

Drafting is a cycling term, which is implemented in Zwift to again mirror real-world riding. Essentially drafting means that your rider will stick in a group and hold the same speed. It is a physics attribute, which applies to real world riding just as in Zwift. This also means that if you are riding closely behind other riders, you can follow their speed even though you are excerting less power (or power to weight). You will simply 'stick' to them. To explain how it works would require a physics degree, it takes practice to learn how to draft.

In reality, it isn't that difficult as it sounds. Usually the rider can take a look at the list of names and try to match (or go just a bit below) the w/kg output from the nearby riders and drafting will come naturally.

3.4. The Social Aspect

Communities, social riding, clubs and events are a big part of the Zwift experience. Most zwifters are part of a club. Clubs adds more purpose to your riding. You can participate in races or events together, challenge each other and more established clubs can get their own unique in-game jersey.

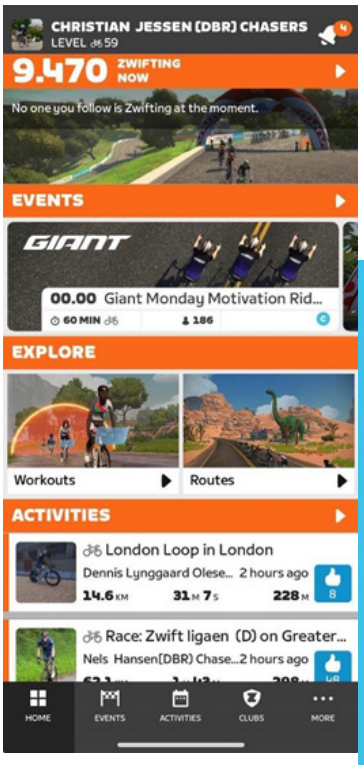
When free riding in Zwift, the rider can interact with any user by using the in-game chat functions. This is a good way to make new friends also cycling and using the platform.

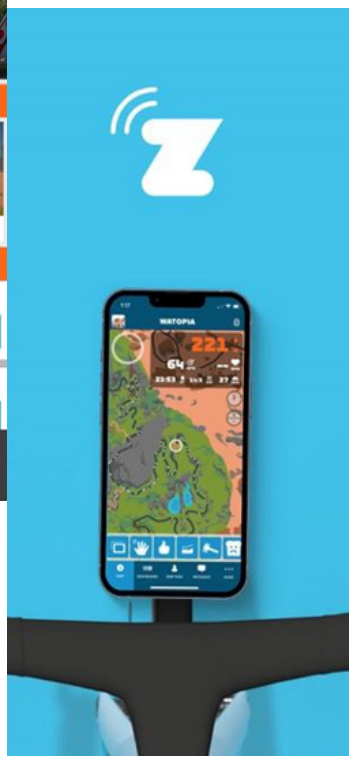
For more information on how to interact with other users, watch this video from Zwift: https://www.zwift.com/ca/video/how-to-cycling/interact-with-other-zwifters

For a new user, looking for a community, the best place to start will be the Zwift Companion App.

3.4.1. The Zwift Companion App

The Zwift Companion app is the (almost essential) sidekick to the Zwift game. It's a downloadable app for your smartphone. The app contains a menu of much of the same information as the main menu of the game.





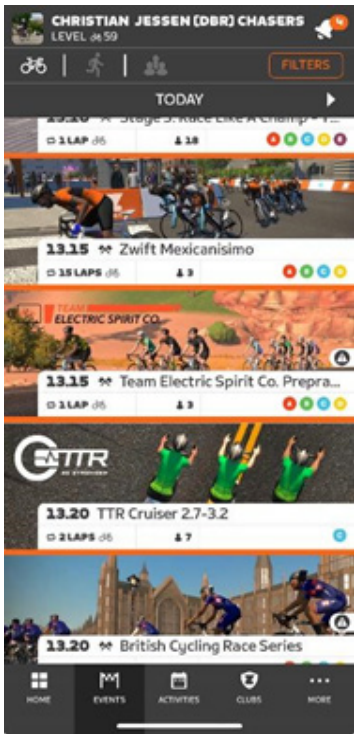
You get an overview of the amount of people zwifting right now (and who from your in-game friend list is online). When connected to the same internet signal as the device from which you are riding in zwift, the companion app will open as an external controller, with a map and a toolbar that will for example allow you to steer in the game. This allows you to control your experience on Zwift, while not having to adjust your setup so you can reach the keyboard of a PC.

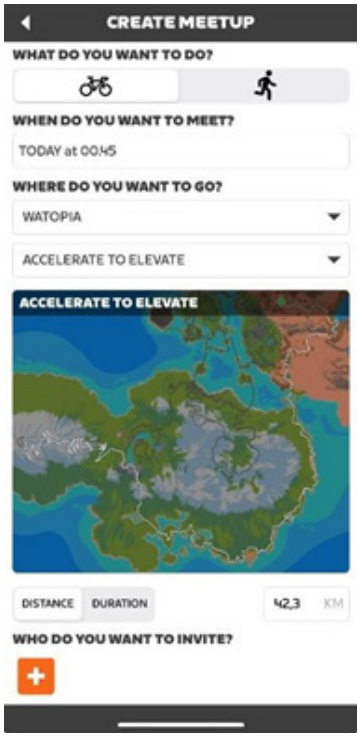
When not currently riding, the Zwift companion app can be used to plan your next ride. Take for example the 'Event' tab, which will give you a full list of all upcoming public events. This list also shows the event organizers, which will later give you knowledge of the different clubs or organizations with active communities in the game.

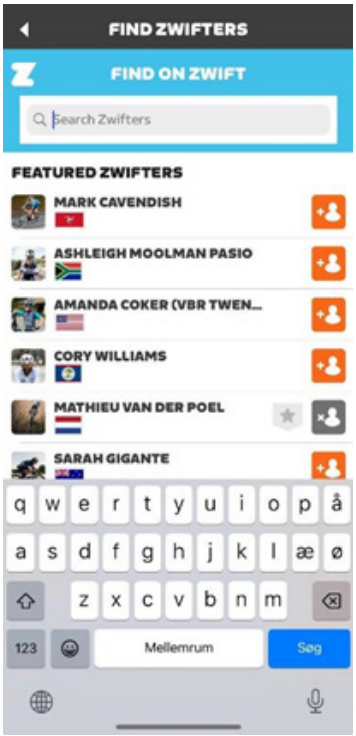
You can plan your own club events, or perhaps group rides. From the event tab, simply slide to the meetup screen to create a meetup with friends. Creating a meetup on the Zwift Companion App automatically adds it to the game. You can schedule a set time for the meetup. When launching the game, Zwift will automatically spawn you into the meetup right before it starts. So will all your friends that have accepted the invite.

From the companion app you can also see your recent rides, as well as your friends' rides. This makes the Companion App a good tool for ride analysis.

If you are looking for how to add friends or contacts in the game, the companion app is the easiest gateway to do just that. Go to the 'More' tab and search for other zwifters under 'Find Zwifters'. When you find whoever you are looking for you can open their profile and send them a friend request.







All in all the Zwift Companion app offers you the ability to:

- Join events & races
- Join and see who of your friends and contacts who are riding
- Add new friends to your in-game contacts
- Remotely control your in-game avatar
- Chat in-game
- Create & Organize Meetups
- Create & Organize Clubs
- Plan future events & workouts

3.4.2. Finding and joining a Zwift Club or Community

After some time on the platform, you'll get a sense of the massive community aspect to the game. Just riding in the open world, you will meet large groups of zwifters riding or training together. You might want to join a community like that. Luckily it iss very easy to become part of a community, as it is core to most of the zwift users that communities are open and welcome to new members. After joining events, either through the main menu or the zwift companion app, you get a sense of the larger zwift communities. How to join them can vary. Sometimes the event description will guide you to a website, but mostly the communities are centered around Facebook groups or large community channels on the third-party software 'Discord'. Simply follow the guides from the descriptions or search the communities on Facebook to get in touch.

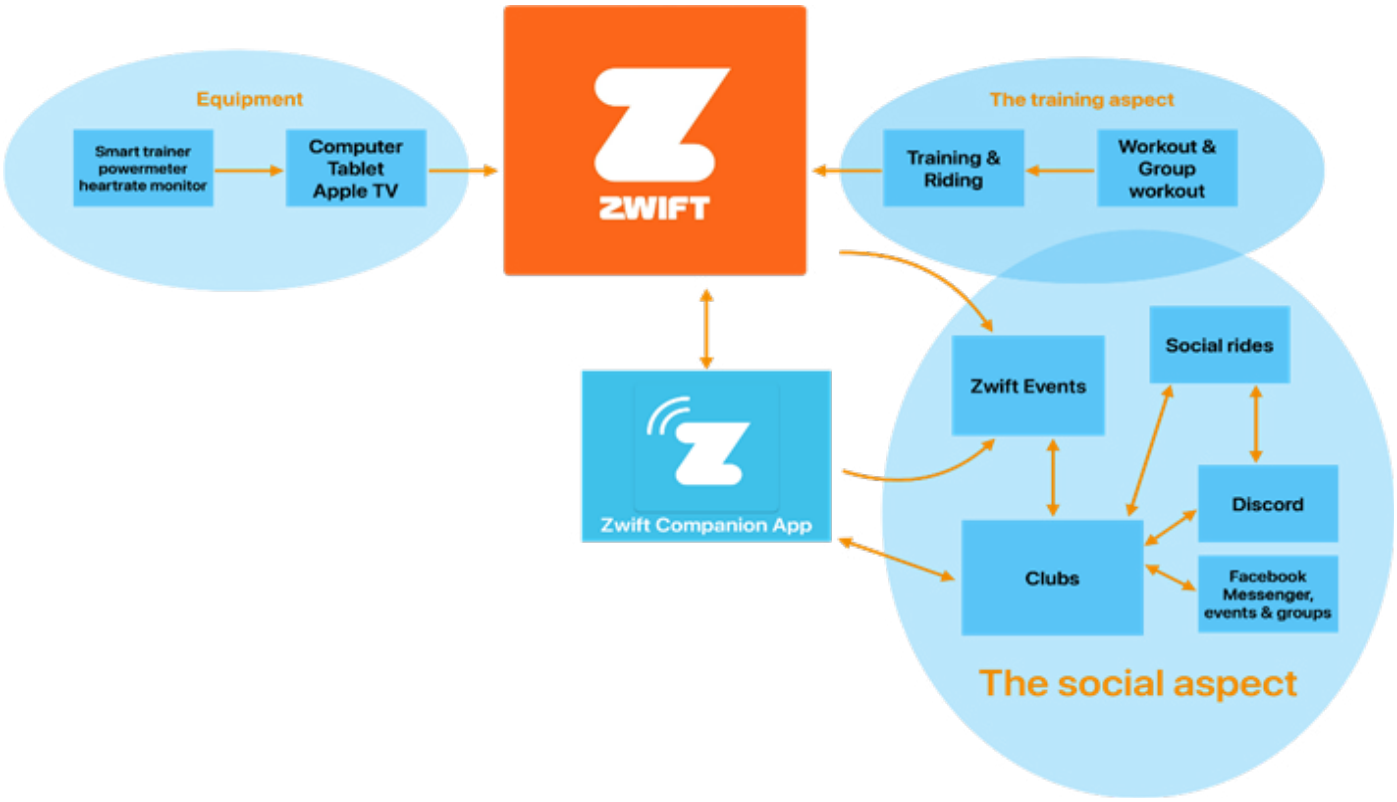
The more integrated you become in a community, the more you will find like minded people who approach Zwift and e-cycling with the same mindset and goals as you. Perhaps you are into racing events and suddenly have a club or team to represent. You might all join the same race, wear the same jerseys, and help each other for a better chance to win the race or just beating a rival club.

Maybe you find motivation in suffering through training intervals in groups and can join the discord channel while you are riding and chat with other people from your club, also currently riding. You can organize or set up workouts together or create meetups via the companion app.

Communities and the social aspect adds a whole new dimension to the e-cycling experience. It can be much like organizing club rides in the real world but in many ways, it is easier and more flexible on Zwift. You don't have to be in the same city or even the same country to ride together. You aren't limited by weather or any other time of day conditions. This makes Zwift and e-cycling a perhaps stronger community force than regular outdoor cycling.

Online communities even have the possibility to extend the social aspect of your club or community from outdoor riding. For example, it is possible for any user to create a club via the companion app. By using this feature, you can take your regular club from the outdoor season, inside by creating your club in-game. This way, the social aspect of cycling with your local community carries on into the winter months. If your club has a training plan, the coach can now schedule in club trainings on Zwift, thus upholding the social training rhythm from the rest of the season.upholding the social training rhythm from the rest of the season.

3.4.3. Drawing/framework to show how things are connected



3.5. Further comments

These topics has been very comprehensive to describe. For this reason, some parts still need to be described. These are:

- Zwift and Youth

  How to use Zwift in regard to youth riders in general and in cycling clubs.

- Group Rides

  Very essential to address in depth since this is very relevant to the mail target group of this Handbook.

- Group Workouts

  Very essential to address in depth since this is very relevant to the mail target group of this Handbook.

- Zwift Companion App

  We have described some features but more needs to be addressed even more since the Companion App is an essential tool when using Zwift. For example, the Club Feature which is essential to the main target group for this Handbook.

Organizing a race

4.1. How to organize a race

Zwift races have their own "rules", which means that e-cycling as a sport also requires a certain specialization, knowledge of the environment, algorithms and competition rules, which is different from a classic cycling race.

When taking part in a virtual race on Zwift, you must be aware that you will have to face the draft effect just like in real world, occurring when riding behind another rider or in the peloton.

However, when competing on a virtual platform, there are certain aspects related to gamification, such as the ability to use power-ups (PowerUps give a small bonus) during the race.

Some virtual platforms also offer track-changing controls (available as an option on some smart bikes or in Zwift Play device)

The specificity of this type of events, dedicated settings, and the need to verify results mean that the possibility of organizing races is currently available in most cases, only to selected communities/organizers (in the case of the Zwift platform)

If you want to organize a race, it is worth contacting your national federation (if there is an e-cycling commission) or a local, leading community that has more opportunities and experience than the average person or individual.

However, there are possibilities to organize a race or other form of competition with less commitment.

The first and most important thing is to generate a dedicated link to the event through which participants will be able to join.

A link to the event can be generated using the "CLUBS" functionality.

The question is how deeply we want to go into this issue. Before you will be able to create specific link you must create a Zwift Club: How to Create and Set Up a Zwift Club | Zwift Insider.

Once you have your club set up, follow the guidelines: How To Create Zwift Club Events | Zwift Insider.

Important Update:
(January 29, 2020)
Zwift is not taking new event requests at this time.

4.2. How to participate in a race and how to race on Zwift

[How to Race on Zwift (Setup, Strategy, and More) | Zwift Insider]

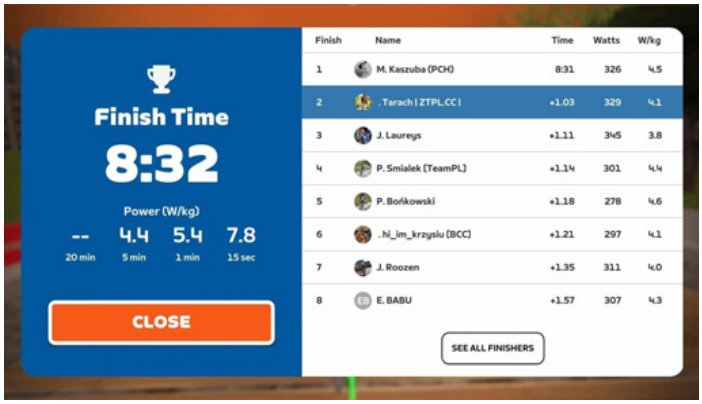
Racing on Zwift is a completely different dimension and experience than ordinary ride on a trainer. Virtual races cannot be compared to the regular races we take part in in the real world/outdoors.

One thing is certain, everyone will find their place, regardless of the level of training and skills and competition will allow you to reach higher and higher levels.

What should you do to get the most out of Zwift's racing functionality? Below you will find the most important information, these are recommended actions, but do not determine whether you will be able to compete.

Step 1: Share your ZwiftPower and Strava data

After crossing the finish line, information about the completed race will appear on the screen, but the data is "raw".



Most races run on the Zwift platform use the ZwiftPower website to generate final race results.

These results take into account additional requirements of the race and ensure the correctness of the powers obtained by the competitors

If you want to be included in the official results, you must agree to share your riding data with the ZwiftPower platform. Without this, your result will not be included. Please pay attention to this, it is one of the most often skipped steps!

Step 1: Log in to your account at my.zwift.com, click My Profile > Connections and click to enable data sharing with ZwiftPower.

Step 2: Create and verify your ZwiftPower account

Visit www.zwiftpower.com and create an account. You log in with the same details as your main Zwift profile.

Log in, then click "Connect" and follow the instructions to verify your Zwift account and connect it to ZwiftPower (you'll need to know your ZwiftID).

Once you've entered the correct ZwiftID, you'll need to verify account ownership by adding a 4-digit code to your name in Zwift (the eassies way is to do it via the Companion app) After short period of time, just click "Link My Account" in ZwiftPower.

Once you've connected your account, you're all set!

Step 3: Consider purchasing a heart rate monitor. Most races require heart rate data to be sent because it helps organizers detect irregularities.

Step 4: Make your profile credible, you can do this by connecting your ZwiftPower profile with Strava, where there is all the history of your outdoor rides

Step 5: Find a race.

Visit Zwift calendar or use the Companion app to see a list of upcoming races. Once you have selected your race, read the race description. It should contain everything you need to know about the rules. Also you will find there information about the rout and the length of the race. Read race description carefully! It will help you avoid disqualification.

Step 6: Select your category.

Most Zwift races divide competitors into categories, giving more people a chance at the "podium" and making the competition more open. The vast majority of races on Zwift are based on Zwift categories.

Another common categorization scheme is based on your FTP:

A: ≥4.2W/kg and ≥250W FTP
B: ≥3.36W/kg and ≥200W FTP
C: ≥2.625W/kg and ≥150W FTP
D: <2.625W/kg or <150W FTP

If you don't know what "FTP" means, check out what is FTP (functional threshold power) and why does it matter in Zwift? If you don't know your FTP, check out How can you measure your FTP?

Some races are held in the E (Open) formula, where no categorization applies.

Important: A competitor can join his own category (it is assigned automatically by Zwift based on data from previously registered rides, races) or to a higher category. A competitor cannot join a lower category race!

Step 7: Join the race.

Joining most races is like joining any group ride on Zwift, just join the event in the correct category and run the game!

Please remember to read the event description, different organizers may require additional steps or verification protocols. If there are any specific requirements, these must be met to be included in the final results

Step 8: Save your ride.

Save your ride in Zwift, which will save the data in Zwift systems and send it to Strava as well. This allows ZwiftPower to retrieve all necessary data to generate results

View results on ZwiftPower.com.

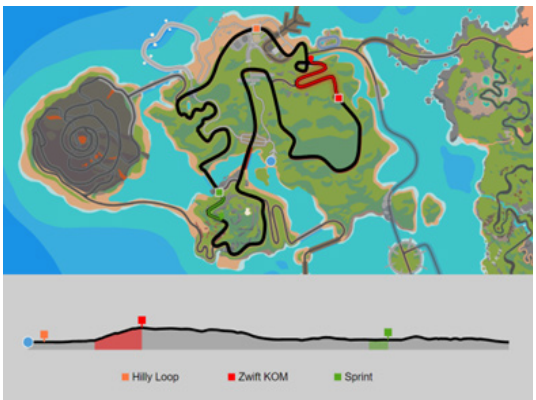
Go to www.ZwiftPower.com. Race results will be displayed immediately after the competition ends and are usually the final results as well. They are visible on your ZwiftPower profile. Sometimes the results may be generated with a slight delay, this happens when the race attracts a large number of competitors or additional verification of their correctness is necessary.

4.3. Tips and tricks

Get ready for a fast and hard start: The start of a Zwift race is largely similar to the start of a CX race: the first few minutes of most Zwift races are difficult, with riders pushing to overtake weaker riders and establish selections. Warm up before the race, time your start to generate big watts when the clock hits 0. It should calm down after a minute or two.

Draft effect: Just like in the real world on Zwift we have a draft effect. The draft effect in Zwift is strong. Using draft effect could allow you to save some energy for the finish. A very important aspect is riding in the peloton, even a momentary loss of contact (wheel) with players in front may result in you not being able to catch up with them.

Know your course: different races have different lengths on different courses. Familiarize yourself with the route to know when group attacks may occur and prepare in advance to push harder, often by getting into a good position in the peloton before upcoming difficulties on the course allow you to save energy or react to potential attacks



Be prepared: Before the race, make sure you have drinks, gels and the power supply in your computer. Ensure proper air circulation

Improve your ride: As you level up and achieve higher levels in Zwift, you will unlock faster bikes and wheels. The time difference between a "basic" and the fastest Zwift setup in a 1-hour race is over 60 seconds! Take in mind that different bikes (time trial, gravel, mtb, road) perform differently on a specific type of surface available on Zwift roads. Remember that time trial bikes don't have draft! Don't use them during normal races.

Gamification: Power-ups provide a slight advantage if used wisely, and most races involve power-ups. Power ups can be obtained at specific points in the race along the course. They can be assigned randomly or at the organizer's request according to specific race settings

PowerUps in Zwift

Hosting Events

In this chapter you will learn about the most popular types of events in which you can participate or organize.

Using all the functionalities of the virtual application, as an organizer we can create several types of events. It is natural that the most popular are those played online.

However, the application, which basically only needs the Internet and facilities in the form of a bicycle trainer, gives both participants and organizers the opportunity to compete not only from the comfort of their homes in virtual events.

5.1. Virtual Event

Zwift gives you the opportunity to choose what type of activity suits you best. You can join group rides, enter races, do workouts or just go for a solo outing and explore the Zwift worlds.

Free Ride

When Free Riding in Zwift, you select your own world and route from those available. You can select one of our recommendations from the JUST RIDE carousel on the Home Screen, or you can select from all available routes.

Workout

Workout mode is designed to help you reach your fitness goals. We offer a range of different pre-made workouts as well as training plans to meet all your needs. We even offer workouts grouped by how much time you have to burn. Want to create your own workout? No problem! You can create your own custom workouts in-game—you can also share and import custom workouts.

Event

Looking for some company? Whether it's a group ride or a race, Zwift mass-start events give you a chance to experience the rush of riding in a peloton—from the comfort of home. With the following event types and varying intensities available all day, every day, we're sure you'll find the perfect event for you.

- Fondo: A mass endurance challenge where hundreds—or even thousands—of cyclists compete against the clock and each other.
- Group Ride: Social rides where you can select a group that matches your pace.
- Group Workout: Train at your own ability, but in a group setting while Zwift keeps everyone together.
- Race: A thrilling and challenging way to get fit, fast.

If you want to organize an event, a group ride, a ride with an ambassador or in the form of a competition - a race, the most important thing is to have and report such an event to the official Zwift calendar.

After obtaining approval, a dedicated link is generated for each event, thanks to which participants can join it.

Event can be public (everyone can join it) it is visible in oficial Zwift event calendar, or it can be private/invitation only (only participants who receive from event organizer dedicated, privat, link can join.

5.1.1. Inviting Your participants

In the case of a public event, use all opportunities to reach the largest possible target group, these may be groups and communities on Facebook, social media of the organizer, partners and sponsors or industry media.

In the case of a private event, you can use the registration form in which we will ask you to leave your e-mail address to which a special link to the event will be sent.

5.1.2. What is needed for Virtual Event

If we are organizing a regular “coffee ride” event or a ride with an ambassador, it is advisable to have a so-called ride leader, who is marked during the ride with a special yellow marker.

His role is to animate the ride by, among others, monitoring its assumptions (pace), maintaining the involvement of participants by, among others, communicating with them during the event.

In the case of a race, the most important thing is to define the rules and regulations, i.e. whether it is divided into categories or has an open formula and whether the organizer requires, for example, the use of a heart rate monitor, etc.

In the case of races, the regulations should include information on whether it is a race to the "finish line" or a type of point race, where, for example, during the race on various segments of the route, in addition to the finish line, there are points to be won.

In the case of a private event, you can use the registration form in which we will ask you to leave your e-mail address to which a special link to the event will be sent.

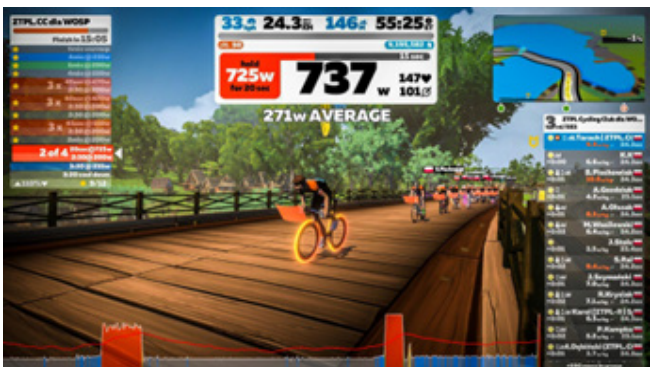
[Olympic Esports | Series and Week 2023, Stories, Performance & Wellbeing (olympics.com)]

5.2. Live Event

Unlike a virtual event, during which each participant (rider) uses the application at home, in the case of a live event we are dealing with a situation where a larger number of people compete (take part in the ride) together in one place.

Typically, this types of events are organized in a bigger room/hall that can accommodate competitors, staff, and in some cases also the audience.

In this case, the event/race also takes place on the Zwift platform, but unlike virtual competition, competitors ride side by side in one room.



5.2.1. Inviting Your participants

The way we want to invite participants depends on the nature of the live event.

It may be the final of a competition for which qualifications were online, it may be a demonstration event to which we invite famous and recognizable people, or it may be a demonstration event when we want to promote, for example, a school or a cycling club. In all cases, the most important thing is that all participants show up in one place at the same time :)

It is up to the organizer whether to provide them with all the equipment or, for example, they must take bicycles with them that will be used to mount them in the trainer.

5.2.2. What is needed for Live Event

If the Live event is a race, it is important that the organizer provides all participants with the same conditions for competition, i.e. trainers, computers (devices needed to run the application), fans.

During a live event, it is also important to provide participants with:

- smart bikes or trainers along with training mats and fans.
- for each participant, a device on which we will run the application. In the case of tablets, it is worth having special stands that will enable them to be mounted. In the case of computers, it is worth considering special tables where you can also store energy gels or drinks.
- good ventilation/circulation/cooling of air (especially if the room is large, without windows and there are more people in it.
- stable Internet connection that can withstand a single connection of a larger number of receivers (devices necessary for competition).
- a large number of extension cords needed to connect all devices. One competition station usually has 4 power inputs (PC, TV, fan and trainer)
- a set of basic bicycle tools, including a wrench for replacing cassettes.
- several people to serve (the number depends on the number of participants)
- keep safety rules around the venue. Prevent people to be too close to riders and trainers!

5.2.3. Running the Live Event

The live event could be run in two scenarios:

1. Event is live, riders join worldwide (it need attention and well prepared agenda, timing)

Running / participating in the worldwide live event, there is not much space for our interaction - most important is to give spectators full perspective and information about what they see. This way it would be nice to have a lead (microphone) on the venue and perform live comment.

In this case, we must ensure that each competitor connects with the organizer via videoconference. The image from each player's camera will then be shared on the

screen, or it can be overlaid on the image from the game (single player).

2. Event is run locally - there is full control in case of start times and all scheduling etc

Depending on the live event type, we can manage the venue and riders in a little different way.

In such a case, in addition to the image from the game, the players' competition should be broadcast from the room where the competition takes place.

It is also advisable to have a commentator and a person who will record the players. Additionally, you'll need someone to take care of the game images you stream online

5.2.5. Big screen viewing / On-event game zone

Not a big experience in this case - the stream is not difficult to prepare. Usually it is made by the independen game client (viewer account) and the "live view" is the big screen's picture source.

5.3. Hybrid Events

We deal with it in a situation where the event has two stages of competition.

The first stage of the competition involves playing a race on a virtual platform in a traditional way, i.e. each competitor competes at home on the trainer he or she has.

This stage is usually treated as a form of qualification.

The second stage of the competition involves organizing and gathering the players selected during the qualifications in one place so that they compete side by side.

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