

True trailblazer



Canadian Geographic's January/February 2018 issue delves into Christian Bagg's journey to invent the Icon Wheelchairs' three-wheeled 'Explore,' an agile machine to get people with limited mobility out onto backcountry nature trails. Explore the infographic and the following questions to learn about the science behind this invention, the challenges in perfecting its design, and how it all came to together.



Check for understanding

1. What motivated Christian Bagg to invent the Explore?

2. Describe some challenges that Bagg encountered or might have encountered in inventing and perfecting the Explore.

3. It took Bagg six years and 16 major design changes to arrive at the current Explore model. Describe a time when you have had to start over or refine a project, in which you demonstrated great perseverance like Bagg.

4. In your own words, describe the special features of the Explore and their function. Which part do you find the most impressive and why? What would you redesign/change and how would you do it?

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Extend your geographical thinking

1. Let's get everyone outside!

A) Choose a physical region in Canada or the world. Think of what you would need to explore it (bicycle, hiking shoes, skis, sled, ropes, carabiners, etc.). In the box below, design a machine for a specific clientele and with the purpose of getting people outdoors in your chosen physical region. Label the parts.

Machine name: _____
Target clientele: _____
Physical region: _____

B) Justify your design choices, making sure to link your decisions to the needs of your clientele and the challenges of the specific terrain/environment.

2. Plan a trek!

Using a trail map, such as [these ones](#) from Alberta Trail Maps, plan an afternoon trek and use Google Tour Builder to map it out. Think about what you would need for your chosen trek to keep yourself safe. Think about the terrain, the wildlife, the temperature, etc. Include all of your planning in your tour.

Resources

- Nature For All
- Ontario Trails: Accessible Trails
- Nature For The Blind: Canadian Trails
- Greater Bragg Creek Trails Association
- The Great Trail
- Canadian Parks Council

DISCOVERY

INFOGRAPHIC

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Icon Wheelchairs' three-wheeled 'Explore' can get people back into the backcountry

By Nick Walker

All of a sudden one day in 1996, Christian Bagg could no longer snowboard, mountain bike or hike the backcountry he loved so much.

A snowboarding accident broke the young Albertan's back, but he was soon using skills acquired as an apprentice machinist at the University of Calgary to build a wheelchair that actually fit his 6'5" frame. He started designing better equipment for medical tech companies, and by 2010, had founded Icon Wheelchairs with 13-time Paralympic medalist Jeff Adams.

Frustrated by attempts to navigate narrow backcountry routes in a sit-ski, Bagg started channelling his innovation into returning to the trails — and to do so at the same level as before.

About six years and 16 major design evolutions later (many tested around The Great Trail's West Bragg Creek routes), Bagg arrived at the Explore model illustrated here, an agile electric machine on which he can keep up with and even outpace experienced mountain bikers.

Provincial parks in Kananaskis Country and Pincher Creek are developing Icon-lending programs for their trails, and Bagg has built push-pull models for camps for kids with cancer and with disabilities. "My focus," he says, "is all about getting the people who can't get outside, outside."

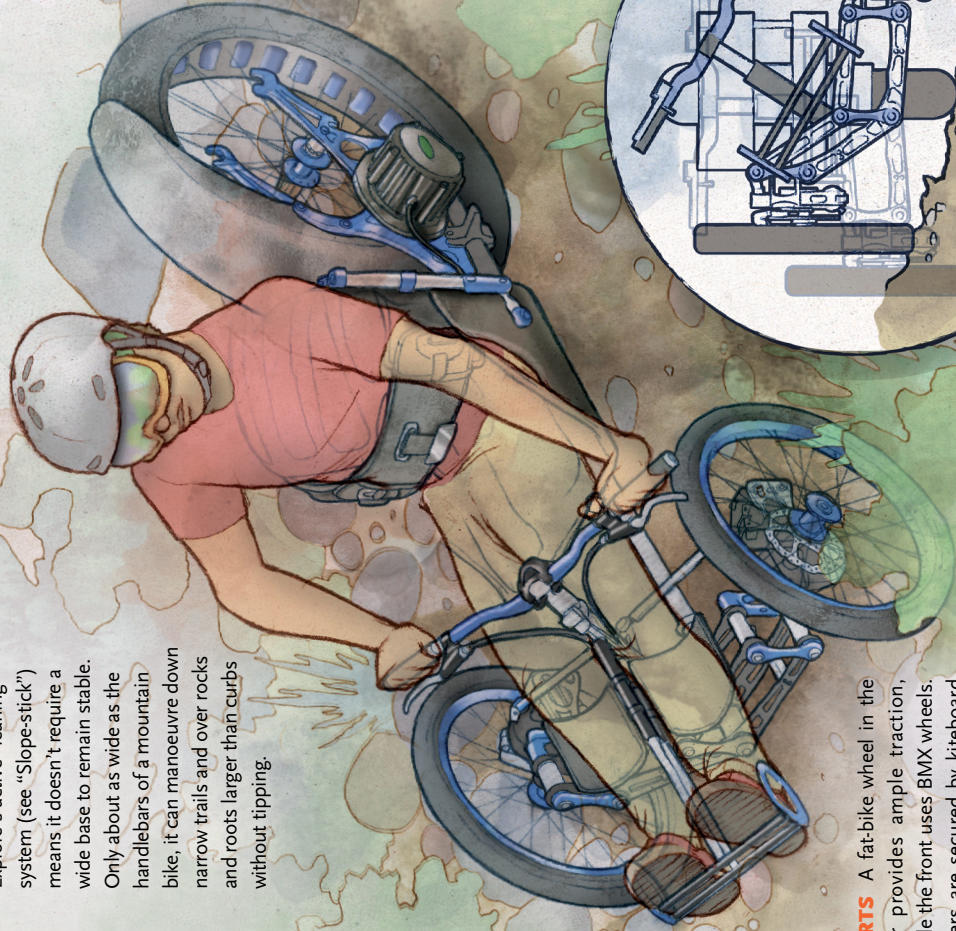
Teachers! Bring this science innovation into your classroom by visiting cangeoeducation.ca/resources.



ANDY MORA/CAN GEO

EXPLORE OPTIONS Icon also makes models with smaller rear wheels and less powerful motors than the Explore pictured here, as well as assisted push-pull versions for people with a variety of mobility challenges and disabilities.

TRAIL ACCESS The Explore's active "leaning" system (see "Slope-stick") means it doesn't require a wide base to remain stable. Only about as wide as the handlebars of a mountain bike, it can manoeuvre down narrow trails and over rocks and roots larger than curbs without tipping.



PARTS A fat-bike wheel in the rear provides ample traction, while the front uses BMX wheels. Riders are secured by kiteboard harness and leg straps. Bagg uses top-end but widely available components wherever possible to simplify maintenance.

ICON EXPLORE SPECS

Size 1.8 m long X 0.8 m wide
Weight 45 kg (30 kg for push-pull version with no battery or motor)
Top speed Governed at 30 km/h (Bagg has tested his at 80 km/h)
Steepest incline 45 to 60 degrees, terrain dependent
Ground clearance 15 cm
Cost ~\$14,000 (base electric model)

POWERHOUSE A 3,000-watt electric motor (powered by a 52-volt lithium e-bike battery) drives the Explore up inclines steeper than most mountain bikers can handle. One charge is good for a 20-kilometre trail, and riders can pack extra batteries for longer adventures.

SLOPE-STICK An articulating front mechanism allows the Explore to rip over rough and uneven trails, keeping the rider perpendicular to gravity on side slopes of up to 35 degrees. "Even on skinny, off-camber trails, the Explore moulds itself to the terrain," says Bagg. "There really isn't anything else out there that deals with side slope like this."

