



Mobility Worldwide Conference 2022  
Evolution of His Wheels International's Trike

Let me begin by saying Thank you to Scott for the invitation to speak. I want to say thank you for Mobility Worldwide's contribution to the ongoing industrial wide collaborative work. Here are a few important things that have come from last year's industry wide conference and the ongoing monthly meetings we've had for building relational trust so we can work together.

1. I've been invited to share about the evolution of His Wheels International with you today.
2. We've had about 4-5 monthly meetings open to those doing similar work. We are building relational trust among agencies, sharing our strengths, acknowledging the need for creating and implementing best practices around mobility work.
3. We are beginning to create consistent language. For example, during one of our monthly meetings, a World Vision representative asked for volunteers to look over a new document. The draft was over 50 pages long. I wondered what I had to contribute? Only 2 words, but those 2 words help to provide clarity within the mobility industry. One was the word tricycles—which conjures up a toddler's form of mobility. The other was a cart. In this room that is music to your ears, however, a cart has many connotations. It's true we all have "PET" names for our mobility devices (cart, trike, freedom chair, safari seat, beeline, whirlwind, etc), but with the input of HWI's Physical Therapist, pointed out that in the rehabilitation sector they are all known as hand-cycles—a self-propelled, wheeled form of mobility.

4. For now, instead of taking on another expensive conference, our goal is to continue to meet monthly via Zoom calls, find ways to fit into or create a meeting time at conferences already occurring like this one, Global Health Missions Conference, The International Society of Wheelchair Professionals, and others.
5. Two groups are headed to Ethiopia to evaluate the work being done with Melese, a person with disabilities who with the assistance of Soddo Christian Hospital and after HWI sent 15 trike kits to Soddo Hospital with Melese being the conduit for our trike work there, began his own organization. I was able to share with the 2 going, one of SCH's board members who was vital in getting the HWI trike work over, and suggesting they communicate, or invite the SCH board member, also a nurse, to join them. I was also able to give them the history of how Melese began doing trike work.

**Show intro video—4 min. of HWI.** As you watch this video, you will hear James McDonnel, who did a radio interview with me on NPR, discuss HWI's goals, that have more fully been actualized through the conference that MW hosted last year.

**Now as I share about HWI's evolution, you can see how being part of a collaborative work is part of the fabric of our ministry.**

If I can take a welding class, I can build a trike! A month later I met Kevin. He said, I'm a mechanical engineer. Can I design, build and pay for the trike prototype? He thought it would take one design. Now 22 designs later we are still working on improvements. He said, "It's harder to build a trike than a rocket."

My idea of providing a tool so the nationals could help themselves began when I was 21. I spent the summer in Zimbabwe Africa to see if God was calling me to be a missionary nurse. Instead of working in a bush clinic as was planned in America, I found myself living with a

Shona speaking family and working with Youth for Christ and Scripture Union. The greatest gift and lesson I received was the honesty of seeing missions from a national's perspective. The Nyatsambos and I embarked on a 9-week intensive cross-cultural course—living life together and helping each other learn from the other.

## Background

- Given my personal background, of having ridden cross-country twice on a bike that was too big for me, I understand the need for proper fitting and the damages occur when our assistive device doesn't fit properly
- As a nurse I understand the need for making sure we are caring for the whole person, which includes skin integrity, ergonomics, seating and promoting independence.
- As a physical educator and one who was certified through the American College of Sports Medicine as an exercise specialist, I understand the benefits of proper movement for holistic health.
- My missions background—spent a summer doing an intensive cross-cultural course as I lived with the Nyatsambos, a Shona speaking family in Zimbabwe while on a mission trip.
- Now having lived with an unseen disability for over 30 years, I am all too aware of the negative attitudes and stigmas that a person with disabilities struggles against and thus it was important to realize the trike had to enhance the person's well-being aesthetically. It wasn't enough to stop with creating something and then having the smug attitude of, "I did something for you, you should be happy with what I've given you," but instead to include the end user in the discussion.
- Having networking as part of my DNA, once our engineer showed up, I knew we needed a team to evaluate the trike. Our team has included nurses, orthopedic surgeons, missionary surgeons and nurses, nationals, those with disabilities, OT's, PT's, Adaptive

physical educators, RN's, engineers, student design teams, others doing similar work, etc.

## **Guiding Principles**

- A ministry for God's glory, guided and directed through prayer.
- Not asking for money as God challenged me. (doesn't mean others can't ask for money on our behalf). We've been a financially lean yet flourishing organization.
- Limited physical resources being totally disabled
- Doing what I do best—networking, resourcing, without taking on the expectations of others. For example, I wasn't going into manufacturing. (Doesn't mean someone else couldn't use our design or even parts of our design and go into manufacturing).
- Providing a tool so the nationals could help their own people
- Providing dignity not creating dependency and considering ways the trike could help someone earn a living.

## **Mission:**

- Mobilizing God's Work Worldwide through the platform of hand-cycle, (hand propelled wheeled mobility device), we affectionately call trikes.
  - We didn't put limitations on what we were going to do. We came up against limitations. All dreams were equal—not too big, and never too small to pursue.

## **Vision:**

- Furthering God's Kingdom through collaboration, for the further potential and development of hand-cycles, and empowering the end-user via mobility and opportunity.

**I'm going to state the Pillars of HWI and will circle back around later to how we implemented them.**

- Networking: Within and Without
- Research and development of hand-cycles.

- Consulting with others:
- Helping others do what God has called them to do
- Promoting Disability Awareness

## **Paralleling our pillars is how we went about building trikes**

### **What are the criteria for building a trike?**

- Empower others to participate in the process of providing mobility by incorporating their gifts, talents, and resources
- Get the simplest design that could be used in the broadest types of terrain.
- Create a design that is function for people with various lower extremity disabilities.
- The criteria for our trike design included:
  - Making sure the trike fits someone—proper ergonomics
  - Safe for the end user (for example)
    - Proper skin care
    - No rough edges
    - Would not cause further injuries
    - Was accessible from the ground or transferring from a wheelchair to the trike.
  - Making sure it was durable.
  - Aesthetically pleasing (for example)
    - Something we as HWI take pride in, knowing our name and sticker would be attached to the trike.
    - Culturally acceptable
    - Enhance dignity and not insulting the end users self-esteem
  - Accessory considerations and how or who would provide these
    - Haul cargo?
    - Pull little children in a cart behind them?
    - Where the sun beats down?

- The proper cushion for the trike and more importantly for the end user, knowing one size and one type of cushion doesn't fit all. Because this is so individualized, we weren't going to be able to provide a one size fits all cushion but we did provide guideline in our extensive seating manual.
  - We could add all these accessories but instead we added metal plates with several holes to accommodate the individualized accessory needs.
- Versatile design: The trike has many adjustable components so it can accommodate the user ergonomically. (for example)
  - Front end can be raised or lowered so the crank height is adjustable.
  - The seat back and foot rest height and angle are adjustable.
  - The seat height is such that someone can transfer in and out of the trike using a sliding board from a wheelchair or a standard chair.
  - The footrest and frame can assist those getting into the trike or out of it and onto the ground.
- **As our engineer says it's probably harder to build a trike than a rocket because a rocket is built to go to a specific place for a specific duration, and a specific purpose.**

### **Proper Hand positioning for the HWI trike**

- Looking at a clock with hand positions at 12, 3, 6, 9.
- See proper placement on pages 12-14 of our Seating Manual
- Proper hand position is directly related to the proper rake on the front end of the steering column.

- If there is not proper rake (angle) on the steering column then it doesn't matter if there is seat adjustability, the proper hand positions will never be able to be obtained.

## **Back to our Pillars and how we've implemented them.**

- **Networking: Within and Without**
  - Through networking it became apparent that one person's dream became an avenue for many peoples dreams to find a place of expression
  - Sharing ideas: None of our team thought any question was stupid
  - Kevin—an engineer
  - Structural what would have integrity and what would work
  - Nancy—came in and overlaid W/C user principals and applying them to a different mobility device. Nancy is a retired PT who began her career working at a Rehab facility associated with NYU where she worked with adult rehab. She worked on a holistic patient team where seating was included. She then continued and completed her career as a pediatric PT. At the time, seating wasn't as specialized as it is now.
  - Nancy has been on 4 JNF trips as a seating specialist.
  - Nancy has been part of our HWI trike prototyping team since 2006. She has written a comprehensive seating and ergonomics guide for the trike.
    - Nancy said, “you and Kevin were willing to listen—an idea cauldron.”
- **Research and development of hand-cycles.**
  - Ongoing trike research and development—we have made 22 hand-cycles we call trikes.
  - Between 2006-2017 we did 3 small production runs of hand-cycles totaling 70 trikes.



- We sent 15 trike kits to Ethiopia where they were welded together.
- We taught a missionary how to weld. He helped design a trike for where he served in Mauritania. He then went back and with a group of 4 nationals, built 20 trikes.
- We sent a trike to Hyderabad, India with Spring Arbor University. Then SAU business students raised money for 20 trikes to be built there at Coe Vocational School, a school started in conjunction with SAU.
- We sent individual trikes as to be used in 22 countries, testing them in rocky, sandy, hilly, and pot hole laden terrains.
- HWI has designed a metal and wood fixturing system so trikes can be built abroad. The system can be accessed from sitting on the ground, to chair level or from a standing position so those with disabilities could help build them.
- Working on best practices with organizations doing similar work.
- Developed a seating manual with a skin integrity addendum for hand-cycles
- In 2017 we realized the research phase was over. From the feedback received, the following changes were implemented:
  - 1 trike breaking in Haiti, requiring a brace at a weak point in the design (stop by and I'll show it to you).
  - Making a smaller trike
  - Using wheelbarrow wheels and a direct drive
  - Unable to pump up a pneumatic tire so we went to solid tires.
  - Solid front tire cracked after 9 months so we went to the heavier square solid tire.
- In 2017 we began focusing on having trikes built in other countries.
  - We sent 2 to Tanzania and had an engineer evaluate them. He teaches engineering at a vocational school,



with an emphasis on three-wheeled motorized vehicles. A group in Tanzania plans to begin a vocational technical school and have trikes built there but are delayed due to government organizational processing documents.

- Worked alongside an organization in Uganda as they built a HWI trike design from our online blueprints. The first chassis was done with only minor safety changes (sharp metal at spots). The front end needed adjustments for a chain that kept falling off. We were able to evaluate the trike with 2 physical therapists, an engineer, the end users input and the Director of STARS Uganda, a ministry to those with disabilities.
  - The second front end design incorporated a push pull mechanism. Afterwards the organization has decided to pursue their own design and help solve the mobility issues of people in Uganda, employing those with disabilities.
  - A third front end was just completed by Mulago Orthopedics in Kampala, Uganda. They have contextualized the design and added gearing. We are in the testing stages of this design.
  - Free downloadable trike design blueprints. Our goal is to give access to people around the world, so they can improve upon it or adapt it according to their needs
  - Teaching others how to weld
  - Connecting those doing similar type work together.
- **Consulting with others:**
    - Being part of an international judging board for a trike design contest in Pakistan—**show pic of winning design**
    - Critiquing, brainstorming and helping other individuals and organizations evaluate their hand-cycle designs, seating, and safety concerns.

- **Helping others do what God has called them to do**
    - University Trike Consortium: Providing opportunities for students to participate, and use their talents for global kingdom purposes: Engineers, business professionals, Christian Education majors, grade school and up.
    - Coaching, mentoring, and empowering as a dream builder: helping others uncover their passions and discovering ways to implement their passions and dreams
      - Starting organizations
        - Helping a man who was an alcoholic for 40 years and has gotten help and is now alcohol free for 3 years begin a guitar building ministry with some of the goals as HWI has—to find ways for a guitar to be built in other countries.
      - Find a way for their talents and dreams to fit within HWI
      - Connecting them with people doing similar work who can provide guidance.
      - Sharing my story through my books, radio interviews and being a guest speaker.
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- **Promoting Disability Awareness**
  - Receiving the end-users input on trike design and development.
    - Making the trike aesthetically pleasing so someone with a disability is not only provided mobility, but dignity, self-worth, and inspiration to live further into their role as an image bearer of Jesus Christ.
    - Finding ways that those with disabilities can use their talents within HWI
      - HWI has given me a purpose in life with my life-altering disability

- Graphic artist who had 50 brain surgeries by the age of 25 did our last brochure and my 2<sup>nd</sup> book cover.
- Our children's story/coloring book
- Speaking for disability programs in churches, universities.
- Helping others become aware of those living with disabilities within their own countries.
- Helping people incorporate those with disabilities within their churches, communities, and families
- Help others start ministries for the poor, disenfranchised and disabled throughout the world.
  - STARS Uganda
  - A Hospital in Congo
  - Ministry in Tanzania and Congo
  - Helped another organization in Uganda see the need to use their vocational-technical skills to serve those with mobility issues.
  - Trike building in Ethiopia encouraged a person with disabilities there to begin a ministry of providing mobility devices and employing others with disabilities.
  - Helped to open a Kenya leader's eyes and his heart so he could understand, then identify people with disabilities around him, write a story about disabilities and then to say, "I will never again be able to do ministry without including those with disabilities.

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