



CONCEPT NOTE

Introducing 3D Digital Technology for Prosthetic and Orthotic Manufacturing in Somaliland

A locally led, technology-enabled model for faster, more affordable and accessible rehabilitation services.

Project Information	Details
Applicant	Diversity Action Network (DAN)
Technical Partner	Ugani Prosthetics – specialist in 3D digital P&O technology
Primary Locations	Hargeisa Rehabilitation Centre (HRC) and Burao Rehabilitation Centre (BRC)
Geographic Reach	Hargeisa, Burao, rural communities and IDP settlements in Somaliland
Duration	24 months
Indicative Funding Request	US\$298,000
Primary Sector	Physical rehabilitation, prosthetics and orthotics, disability inclusion and assistive technology
Implementation Model	Hybrid conventional + digital manufacturing; hub-and-spoke service delivery
Website	www.dansomaliland.org

September 2026

1. Executive Summary

Diversity Action Network (DAN) proposes a 24-month initiative to introduce 3D digital technology into prosthetic and orthotic (P&O) services in Somaliland. The project will establish a digital prosthetic and orthotics (P&O) manufacturing capacity at DAN's Hargeisa Rehabilitation Centre and integrate appropriate digital assessment, design and manufacturing capacity into the Burao Rehabilitation Centre. The system will also support mobile digital assessment in rural communities and IDP settlements in Somaliland.

The initiative responds to persistent barriers affecting persons with disabilities in Somaliland: long travel distances to specialised services, high production costs, lengthy conventional fabrication processes, limited technical capacity and difficulty reproducing customised devices. DAN will address these constraints through a hybrid model that combines its established clinical and workshop expertise with 3D scanning, computer-aided design (CAD), 3D printing, digital records and mobile outreach.

DAN will partner with Ugani Prosthetics as the specialised technical partner. Ugani brings experience in 3D scanning, digital P&O modelling, 3D printing, digital workflow development and technical training, including partnership experience in Africa and other regions. The partnership will focus on technology transfer and local capacity building so that DAN technicians progressively assume independent responsibility for the digital workflow.

The project will not seek to replace conventional manufacturing. Instead, DAN will identify the devices and clinical cases for which digital technology provides clear advantages while retaining conventional methods where they remain clinically or technically preferable. The project will systematically compare conventional and digital production on time, cost, material use, quality, adjustment requirements, durability and patient satisfaction.

Project at a Glance

Element	Proposed Target
Project duration	24 months
Digital hub	Hargeisa Rehabilitation Centre (HRC)
Regional digital service	Burao Rehabilitation Centre (BRC)
Staff trained	5–10 DAN rehabilitation/technical staff
Patients digitally assessed/scanned	1,000+
Digitally supported P&O devices	300+
Rural/IDP communities reached	10+
Selected-device production time reduction	40–50% target, to be validated
Selected-device cost reduction	30–50% target, to be validated
Indicative budget	US\$298,000

2. Organisational and Programme Context

DAN is a Somaliland-based organisation working to improve the lives of persons with disabilities through physical rehabilitation, prosthetic and orthotic services, mobility devices, physiotherapy, psychosocial support, training, outreach and disability inclusion. DAN operates the Hargeisa Rehabilitation Centre and is developing a rehabilitation centre in Burao to decentralise specialised services.

The Burao facility is strategically important because people requiring specialised rehabilitation from Burao and surrounding areas may otherwise need to travel approximately 350–360 km to Hargeisa. Rural populations and people living in IDP settlements face additional barriers related to transport, poverty, distance and limited access to specialised services.

3. Needs Assessment and Problem Statement

Need / Constraint	Implication
Limited geographic access	Specialised P&O and rehabilitation services remain concentrated in limited locations, creating long and costly journeys for people from Burao and rural/IDP communities.
Time-intensive conventional workflows	Conventional casting, plaster modification and fabrication can require multiple labour-intensive stages and repeated physical adjustments.
Limited specialised digital skills	Somaliland has a limited pool of technicians trained in 3D scanning, CAD-based P&O design and digital manufacturing.
Material and production inefficiencies	For selected devices, conventional fabrication can involve substantial material use and workshop labour.
Difficulty reproducing devices	Conventional devices may require substantial re-fabrication when lost or damaged, whereas clinically appropriate digital designs can be archived and reused as a starting point.
Rural outreach constraints	Community-based services can identify beneficiaries, but specialised fabrication often remains centralised. Portable 3D scanning can shift part of the assessment process closer to users.
Need for evidence	DAN requires local evidence on the cost, speed, quality, acceptability and sustainability of digital P&O manufacturing before large-scale adoption.

4. Rationale for Introducing 3D Technology

3D technology offers an opportunity to modernise selected parts of the P&O workflow without discarding the clinical knowledge and craftsmanship already available within DAN. The core value is not the printer itself; it is the ability to capture anatomy digitally, modify designs precisely, manufacture selected components efficiently, preserve digital records and support a more distributed service model.

Dimension	Conventional Manufacturing	Digital / 3D-Enabled Workflow
Assessment	Manual measurements and casting	3D scanning combined with clinical measurements
Design	Physical plaster modification	CAD-based digital modification and rectification
Reproducibility	Requires substantial re-fabrication	Digital design can be securely archived and reused where clinically appropriate
Customisation	Highly dependent on manual skill	Precise, repeatable digital modification
Production	Labour- and material-intensive	Automated/semi-automated production for selected devices
Material efficiency	Potentially higher waste	Potentially lower waste for suitable printed designs
Rural outreach	Often requires patient travel	Portable scanning can bring assessment closer to communities
Records	Primarily physical/manual	Digital scan and design archive
Technical support	Primarily physical	Digital files can facilitate remote technical review
Replacement	Often requires reconstruction	Archived designs may support faster replacement, subject to clinical review

DAN will retain conventional production capacity because not every device, component or clinical situation is appropriate for 3D printing. Critical load-bearing components such as pylons, joints and dynamic feet will continue to be sourced from qualified suppliers where appropriate. Clinical safety and patient outcomes will remain the primary decision criteria.

5. Technical Partnership with Ugani Prosthetics (Belgium).

DAN will partner with Ugani Prosthetics as the project's specialised technical partner for the introduction and localisation of 3D digital P&O technology. Ugani's role will complement, rather than replace, DAN's clinical and technical leadership. DAN and Ugani already signed a Memorandum of Understanding of the technical partnership.

Ugani's proposed technical contribution will include:

- Technical assessment of DAN's existing Hargeisa and Burao workshop workflows and infrastructure.
- Support in selecting appropriate 3D scanners, printers, software, materials and related equipment.
- Development of a digital P&O workflow adapted to DAN's staffing, patient volume and infrastructure.
- Training in 3D scanning, digital file preparation, CAD modelling, digital socket and orthotic design, printing and post-processing.
- Development of standard operating procedures (SOPs), quality-control processes and maintenance protocols.
- Onsite and/or remote mentoring during implementation and pilot production.
- Support for establishment of a secure digital patient/device archive.
- Technical support for comparative testing of conventional and digital production.
- Progressive transfer of knowledge and responsibility to DAN's locally trained technicians.

Ugani's uFit digital workflow is designed for P&O specialists and supports scan clean-up, guided digital modelling and preparation of designs for manufacturing. Ugani has reported partnerships and implementation experience across Africa and other regions, including work involving P&O organisations in Kenya, Ghana and South Africa, as well as international partners in Asia, Europe and the Middle East.

5.1 Relevant International Experience and Learning

Context	Relevant Experience / Lesson for DAN
Kenya	Ugani has worked with Prothea Kenya, a P&O centre using 3D technologies. This demonstrates application of digital workflows in an African P&O setting.
Uganda	3D-printed prosthetic and orthotic initiatives have been implemented in refugee and low-resource settings, illustrating the relevance of digital technology to geographically underserved populations.
Uganda – CoRSU	Ugandan rehabilitation experience includes use of 3D-printed limbs for children through innovation partnerships, demonstrating practical application in paediatric rehabilitation.
Ghana / South Africa	Ugani's reported African partnership network demonstrates transfer of digital P&O approaches across different rehabilitation environments.
International	Ugani has reported partnerships spanning Africa, Asia, Europe and the Middle East, supporting cross-context learning and technical exchange.

DAN will use this experience as a starting point while generating Somaliland-specific evidence. The project will not assume that results achieved elsewhere will automatically be replicated in Somaliland; cost, time, clinical quality and patient outcomes will be measured locally.

6. Project Goal

To improve access to affordable, personalised and high-quality prosthetic and orthotic services in Somaliland by introducing locally managed 3D digital manufacturing technology at DAN's Hargeisa and Burao Rehabilitation Centres, Somaliland.

7. Specific Objectives

1. Establish functional 3D digital P&O manufacturing capacity at Hargeisa Rehabilitation Centre.
2. Integrate appropriate digital assessment, design and manufacturing technologies into Burao Rehabilitation Centre.
3. Train DAN prosthetic, orthotic and rehabilitation personnel in 3D scanning, CAD design, digital manufacturing and quality assurance.
4. Reduce production time for selected P&O devices by approximately 40–50% compared with equivalent conventional workflows by the end of the project, subject to validation.
5. Reduce production costs for selected devices by approximately 30–50%, while maintaining appropriate clinical and safety standards.
6. Establish a secure digital patient/device database to support continuity of care, modification and clinically appropriate reproduction.
7. Extend digital rehabilitation assessment to rural communities and IDP settlements through mobile outreach.
8. Generate evidence and an operational model for sustainable scale-up of digital rehabilitation technology in Somaliland.

8. Expected Outputs

No.	Output
1	One functional digital P&O production facility established at Hargeisa Rehabilitation Centre.
2	A digital rehabilitation and manufacturing workflow established at Burao Rehabilitation Centre.
3	5–10 DAN staff trained in relevant digital technologies and quality assurance.
4	At least 1,000 patients digitally assessed/scanned or included in the digital rehabilitation workflow.
5	At least 300 prosthetic and orthotic devices produced through or supported by the digital workflow.
6	At least 10 rural/IDP communities reached through digital-enabled outreach.
7	SOPs, quality-control procedures and equipment maintenance systems established.
8	A secure digital library of patient scans and approved device designs established.
9	A comparative evidence base produced on conventional versus digital P&O manufacturing.

9. Key Activities and Implementation Approach

Phase 1 – Preparation and Baseline (Months 1–3)

- Conduct a needs, workflow and infrastructure assessment at HRC and BRC.
- Identify P&O devices suitable for digital production and define clinical exclusion criteria.
- Establish baseline production time, cost, material consumption and adjustment rates.
- Develop technical specifications and procurement plan.
- Develop digital data protection, storage and access procedures.

- Select staff for specialised training.

Phase 2 – Establish Hargeisa Digital Facility (Months 3–7)

- Procure and install 3D printers, scanners, CAD workstations and post-processing equipment.
- Upgrade electrical supply, backup power, ventilation and workspace arrangements as required.
- Configure software, network storage and digital workflow.
- Develop and validate SOPs with Ugani.

Phase 3 – Training and Mentoring (Months 4–10)

- Train selected prosthetic/orthotic technicians and rehabilitation staff in scanning, CAD and digital manufacturing.
- Provide practical mentoring through pilot cases.
- Train staff in equipment maintenance, troubleshooting and quality assurance.
- Develop a local trainer/technical champion structure.

Phase 4 – Pilot Production and Validation (Months 7–12)

- Select representative cases for digital production.
- Produce comparable conventional and digitally supported devices where clinically appropriate.
- Measure production time, cost, materials, adjustments, patient satisfaction and clinical performance.
- Refine workflows based on evidence.

Phase 5 – Burao Digital Service (Months 9–15)

- Equip Burao with appropriate digital assessment and production capacity.
- Train Burao-based staff and link them to the Hargeisa digital technical hub.
- Establish digital transfer of designs between Burao and Hargeisa for complex cases.
- Provide local fitting, follow-up and selected manufacturing.

Phase 6 – Mobile Digital Outreach (Months 9–24)

- Equip outreach teams with portable scanning and assessment tools.
- Conduct community and IDP assessments.
- Transfer digital information securely to Hargeisa/Burao.
- Manufacture devices and coordinate fitting and follow-up.

Phase 7 – Scale-up, Sustainability and Knowledge Sharing (Months 13–24)

- Expand production for validated device categories.
- Develop cost-recovery and social-enterprise mechanisms for clients who can contribute.
- Establish equipment maintenance and replacement reserves.
- Document lessons, case studies and results for donors and rehabilitation stakeholders.
- Develop a post-project scale-up plan.

10. Proposed Digital P&O Workflow

The project will establish a clinically led workflow in which technology supports, rather than replaces, professional judgement:

Patient identification → Clinical assessment → 3D scanning → Digital patient record → CAD design → Clinical approval → 3D printing/manufacturing → Assembly → Fitting/alignment → Functional testing → Follow-up → Secure digital archiving.

11. Hargeisa–Burao–Outreach Hub-and-Spoke Model

Location	Primary Role
Hargeisa Rehabilitation Centre	National digital technical hub; advanced design and production; training and mentoring; complex cases; digital quality assurance.
Burao Rehabilitation Centre	Regional rehabilitation and digital service hub; local assessment, selected production, fitting and follow-up.
Rural / IDP Outreach	Community identification, clinical assessment, portable 3D scanning, referral, follow-up and linkage to Hargeisa/Burao.

This model will gradually shift DAN from a service model in which patients must travel to the workshop towards a more distributed approach in which digital assessment and rehabilitation outreach can reach people closer to where they live.

12. Expected Outcomes and Benefits

12.1. Outcomes for DAN

- DAN becomes a national leader in digital P&O rehabilitation technology in Somaliland.
- Increased service capacity and more efficient use of existing technical staff.
- Improved quality management, traceability and reproducibility for selected devices.
- A skilled local workforce capable of operating and maintaining digital P&O systems.
- Reduced dependence on external technical support over time.
- Improved capacity to deliver decentralised rural and IDP rehabilitation services.
- A documented evidence base that can inform future investment and replication.

12.2. Outcomes for Service Users

- Faster access to appropriate prosthetic and orthotic devices.
- More personalised and reproducible device designs.
- Reduced travel burden for people living outside Hargeisa.
- Potentially lower device costs for suitable products.
- Improved continuity of care through secure digital records.
- Improved access to follow-up and replacement support where clinically appropriate.
- Greater mobility, independence, participation in education and livelihoods, and social inclusion.

13. Monitoring, Evaluation and Learning Framework

Indicator	Baseline	24-Month Target	Means of Verification
Functional digital P&O facility in Hargeisa	0	1	Installation and commissioning records
Digital P&O service in Burao	0	1	Facility/service records
Staff trained	0	15–20	Training records and competency assessments
Patients digitally assessed/scanned	0	1,000+	Digital patient records
Digitally supported P&O	0	300+	Production and patient

devices			records
Rural/IDP communities reached	Baseline to be established	30+	Outreach reports
Production time for selected devices	Baseline to be established	40–50% reduction target	Time-motion comparison
Production cost for selected devices	Baseline to be established	30–50% reduction target	Costing analysis
Patient satisfaction	Baseline to be established	≥80% satisfied	Patient feedback tools
Digital designs archived	0	500+	Secure digital database
Staff independently operating workflow	0	At least 10	Competency assessment

14. Sustainability and Exit Strategy

- Local ownership: DAN staff will be trained to operate equipment, manage digital workflows and undertake routine maintenance.
- Hybrid production: conventional capacity will remain available, reducing dependency on a single technology.
- Maintenance reserve: DAN will establish planned provisions for servicing, spare parts and eventual equipment replacement.
- Cost recovery: selected services for clients able to contribute can generate revenue that is reinvested in materials, maintenance and subsidised care.
- Partnerships: DAN will continue collaboration with Ugani, rehabilitation institutions, universities, technology providers and donors.
- Knowledge retention: SOPs, training materials and digital workflows will be institutionalised within DAN rather than remaining with individual consultants.
- Evidence-based scale-up: only workflows demonstrating clinical, operational and economic value will be expanded.

15. Risk Management

Risk	Mitigation
Equipment breakdown	Warranty, preventive maintenance, spare parts, supplier support and staff training.
Insufficient technical skills	Structured training, mentoring, competency assessment and local technical champions.
Power interruptions	Backup power, surge protection and appropriate electrical installation.
Imported material shortages	Multiple suppliers and minimum stock levels for critical materials.
Poor-quality printed devices	Clinical approval, testing, traceability and quality-control SOPs.
Technology over-reliance	Maintain conventional manufacturing and clear clinical selection criteria.
Data loss/privacy	Secure storage, role-based access, backup procedures and data protection protocols.
Patient acceptance	Patient education, informed participation, clinical follow-up and feedback.

Technology obsolescence	Phased procurement, modular systems and periodic technology review.
High initial capital cost	Phased implementation and evidence-based scale-up.

16. Indicative 24-Month Budget

No.	Budget Item	Estimated Cost (USD)
1	3D printers – 2 large-format and 2 standard/medium units	\$32,000
2	Professional 3D scanners – Hargeisa and Burao	\$16,000
3	CAD/design software and licences	\$8,000
4	High-performance CAD workstations and digital equipment	\$7,000
5	Digital fabrication/post-processing equipment	\$8,000
6	Conventional P&O workshop equipment and tools	\$17,000
7	Burao digital workshop equipment and setup	\$22,000
8	Electrical installation, backup power and protection	\$12,000
9	Initial printing materials and consumables	\$12,000
10	Imported certified P&O components, joints, pylons and feet	\$25,000
11	Staff digital technology training	\$22,000
12	External technical mentoring/consultancy	\$12,000
13	Mobile digital outreach equipment	\$8,000
14	Patient transport/support for poorest beneficiaries	\$20,000
15	Digital patient-record/data-management system	\$7,000
16	Equipment maintenance and spare parts	\$11,000
17	Monitoring, evaluation and comparative study	\$11,000
18	Awareness, stakeholder engagement and knowledge sharing	\$4,000
19	Project coordination/implementation support	\$20,000
20	Contingency/price fluctuations	\$15,000
21	DAN utilities & Administrative cost	9000
22	TOTAL	\$298,000.00

Budget note: These figures are preliminary planning estimates and should be refined through a detailed technical assessment and competitive supplier quotations. DAN should prioritise equipment with strong warranty arrangements, local or regional technical support, spare-parts availability, training and long-term maintainability.

17. Implementation Timeline

Activity	M1–3	M4–6	M7–9	M10–12	M13–18	M19–24
Needs / technology assessment	•					
Procurement and Hargeisa setup	•	•	•			
Staff training and mentoring		•	•	•		
Pilot			•	•		

production						
Burao digital setup			•	•		
Burao digital service delivery				•	•	•
Mobile digital outreach			•	•	•	•
Digital patient database	•	•	•	•	•	•
Comparative cost/time study			•	•	•	•
Quality assurance			•	•	•	•
Sustainability / cost recovery				•	•	•
Final evaluation and scale-up plan						•

18. Strategic Value and Donor Investment Case

The proposed investment is intended to create durable rehabilitation capacity rather than finance only a series of individual devices. A conventional investment primarily increases today's workshop capacity; a digital investment can also create an infrastructure for future production, technical training, design archiving, innovation and service decentralisation.

- Builds local technological capacity in Somaliland.
- Strengthens DAN's existing rehabilitation system rather than creating a parallel service.
- Connects Hargeisa, Burao and rural outreach through a common digital workflow.
- Creates a practical platform for innovation in prosthetics, orthotics and assistive technology.
- Generates measurable evidence for future investment and replication.
- Supports more equitable access for people living far from specialised rehabilitation centres.
- Creates a pathway towards greater operational and financial sustainability.

19. Conclusion

Diversity Action Network proposes to introduce 3D digital technology as a practical, clinically led and locally sustainable innovation in prosthetic and orthotic rehabilitation in Somaliland. The project directly addresses barriers related to distance, production time, affordability, technical capacity and access to personalised mobility devices.

Through the partnership with Ugani Prosthetics, DAN will combine specialised digital P&O expertise with its own established clinical knowledge, local workforce, Hargeisa rehabilitation services, Burao expansion and community outreach capacity.

The project will establish a digital hub in Hargeisa, a regional digital rehabilitation service in Burao and a mobile digital outreach capability for rural and IDP communities. It will retain conventional manufacturing while introducing digital methods where they offer demonstrable clinical and operational advantages.

Most importantly, the project will place technology in service of the person with a disability. The intended result is not simply more advanced equipment, but a rehabilitation system capable of delivering better-fitting devices more efficiently, closer to where people live, while building the local skills and systems needed to sustain the service.

DAN seeks US\$298,000 to establish and demonstrate this digital rehabilitation model over 24 months.

20. Selected Technical References and Evidence Base

- Ugani Prosthetics / Ugani digital P&O technology and uFit workflow – <https://ugani.org/>
- Ugani uFit digital modelling platform – <https://ufit.ugani.org/>
- Zero Project / GIZ, Scaling Innovations: Strategies That Work (2025), including Ugani's international partnership experience.
- Humanity & Inclusion materials documenting 3D-printed prosthetic and orthotic innovation in Uganda and low-resource/refugee settings.
- Recent peer-reviewed literature reviewing frugal 3D-printing innovations in orthopaedics and rehabilitation in low-resource settings.