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Politecnico di Torino
Department of Mechanical and Aerospace Engineering

AMaLAB
Appropriate Machines Laboratory

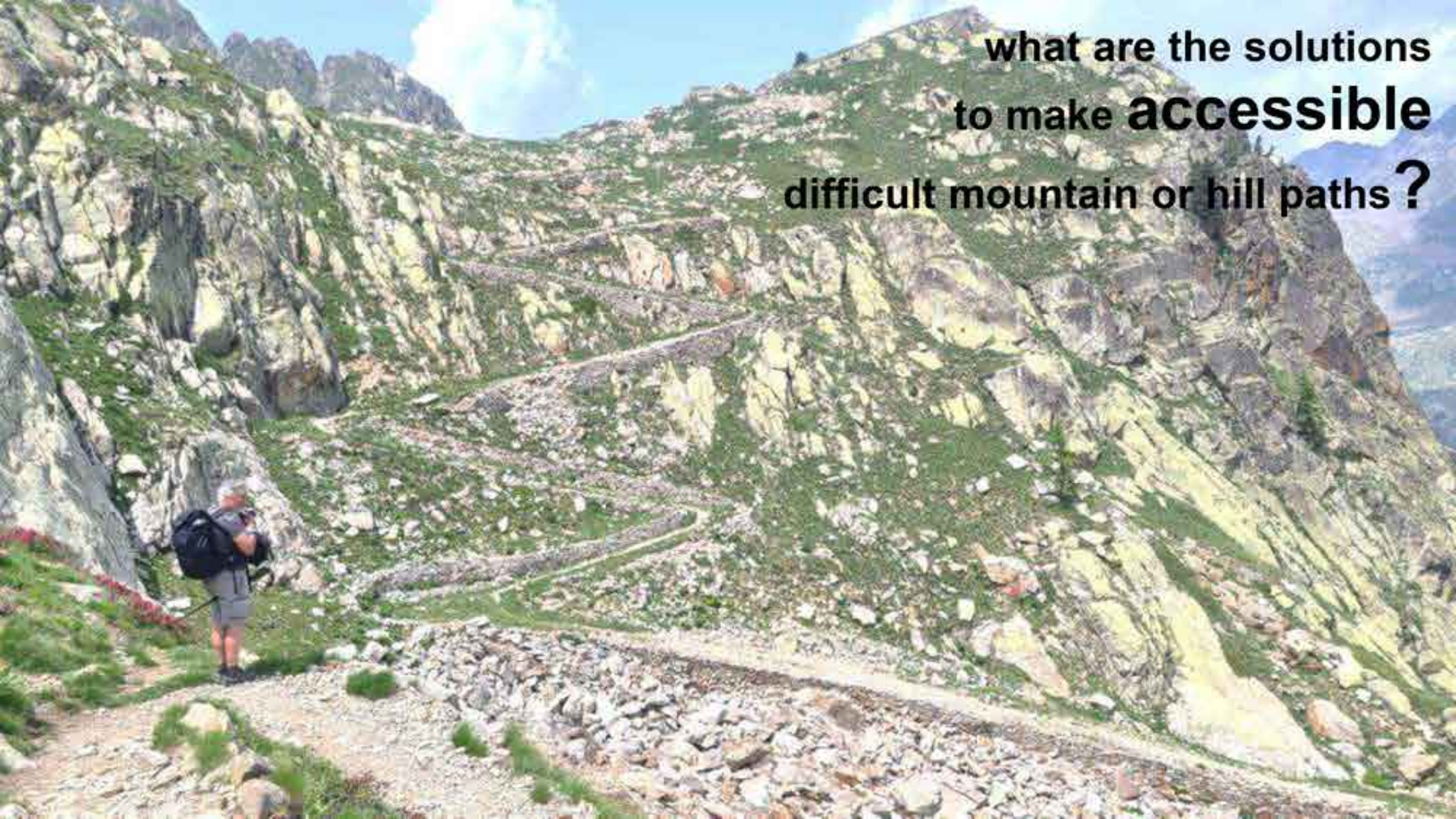
15° CONFERENZA ANNUALE NEXA

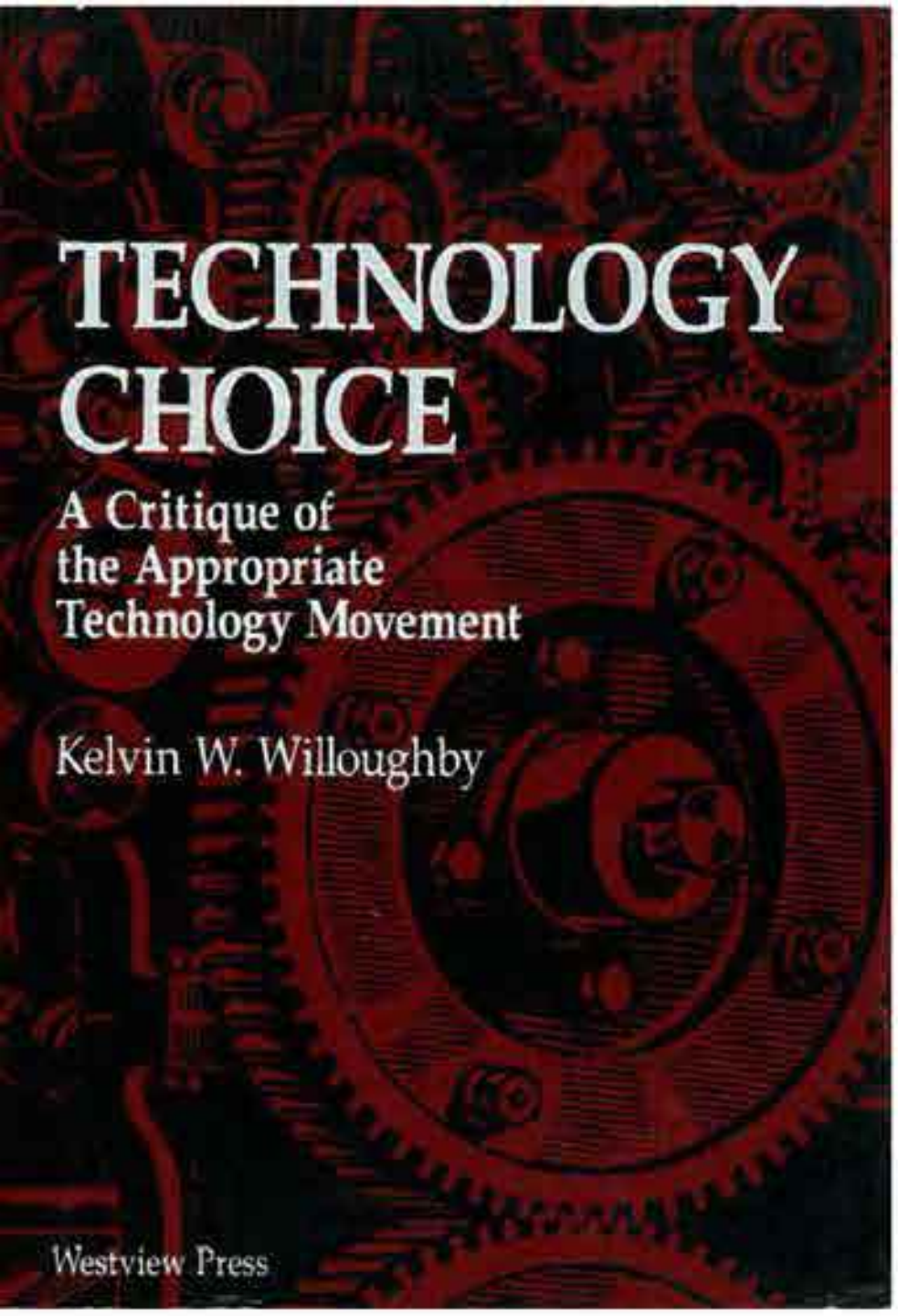
DIGITALI POSSIBILI
RESISTENZA, IMMAGINAZIONE E ATTIVISMO NELL'EPOCA DEGLI ALGORITMI

comunità e tecnologie appropriate

the problem: how making off-road trails accessible for all?

types of off-road wheelchairs


what are the solutions
to make accessible
difficult mountain or hill paths ?



Il concetto di **scelta della tecnologia** può essere spiegato con il fatto che (Willoughby, 1990):

- quasi sempre è disponibile una **vasta gamma di mezzi tecnologici alternativi** idonei al raggiungimento degli **obiettivi primari** all'interno di un dato **contesto**;
- il numero di alternative può essere aumentato nel tempo mediante un processo di **progettazione consapevole**;

Kelvin Wayne Willoughby

Professor of Innovation Management and Entrepreneurship

HHL Leipzig Graduate School of Management

- mezzi tecnologici alternativi analogamente idonei per il raggiungimento di determinati **obiettivi primari** possono variare notevolmente nella loro adeguatezza al raggiungimento di **obiettivi secondari**;

- **la scelta consapevole dei mezzi tecnologici**, tenendo conto sia degli obiettivi secondari che primari, combinati con sforzi a lungo termine per ampliare la gamma di alternative disponibili, **è un elemento importante della politica sociale, economica e ambientale.**

In generale possiamo definire **Tecnologia Appropriata (Appropriate Technology AT)** una tecnologia sviluppata a valle di un corretto processo di scelta tecnologica da parte di una **specifica comunità** in un **determinato luogo** e in un **determinato periodo**.

*An **appropriate technology** is defined as a technology tailored to fit the **psychosocial** and **biophysical** context prevailing in a particular **location** and **period**.*
(Willoughby, 1990)

Ernst Friedrich Schumacher (Fritz)

Bonn, 16 agosto 1911
Switzerland, 4 settembre 1977

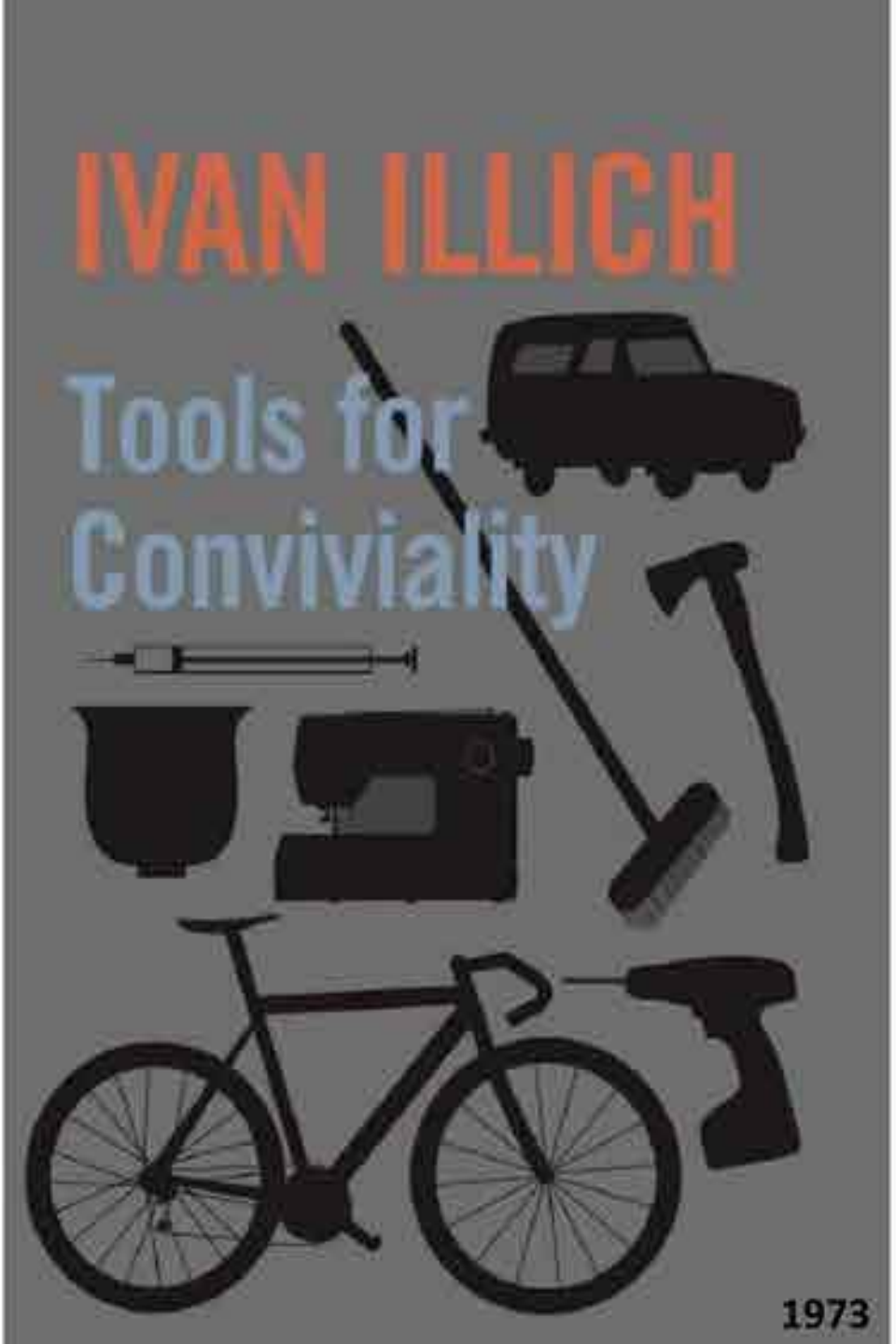
economista, filosofo e scrittore

termine correlato	riferimento bibliografico
alternative technology	magasine Undercurrents (London 1972-1985)
appropriable technology	P. de Pury, People's Technologies and People's Participation (Geneva: World Council of Churches, 1983)
community technology	K. Hess, Community Technology (New York: Harper and Row, 1979); N. Wade, "Karl Hess: Technology With a Human Face", Science, 187 (January 1975), 332-334; G. Boyle, Community Technology (Milton Keynes: Open University Press, 1978); Bakardjieva and Feenberg. Community technology and democratic rationalization, The Information Society, 18 (3), 181-192 (2002)
convivial tools	I. Illich, *Tools for Conviviality* (London: Calder and Boyars, 1973);
eco-technology	M. Bookchin, "The Concept of Ecotechnologies and Ecocommunities", *Habitat*, **2**, 1/2 (1977), 73-85; G. Boyle, "A.T. is Dead - Long Live E.T.!", paper presented to the *A.T. in the Eighties* conference (London, 16th June, 1984);
humanized technology	E. Fromm, *The Revolution of Hope: Toward a Humanized Technology* (Perennial Library; New York: Harper and Row, 1968);
intermediate technology	E. F. Schumacher, *Roots of Economic Growth* (Varanasi: Gandhian Institute of Studies, 1962)
liberatory technology	M. Bookchin, "Toward a Liberatory Technology", in his *Post-Scarcity Anarchism* (San Francisco: Ramparts Press, 1971), pp. 83-139;

termine correlato	riferimento bibliografico
light-capital technology	C. D. Long, *Congressional Record* (Washington, D.C.: U. S. Congress, 8th February, 1977); N. Jéquier and G. Blanc, *The World of Appropriate Technology* (Paris: Organization for Economic Cooperation and Development, 1983), p. 10;
modest technology	R. Vacca, *Modest Technologies for a Complicated World* (Oxford: Pergamon, 1980)
participatory technology	J. D. Carrol, "Participatory Technology", *Science*, 171 (1971), 647-653;
progressive technology	K. Marsden, "Progressive Technologies for Developing Countries", *International Labour Review*, **101**, 5 (1970), 475-502;
radical technology	G. Boyle and P. Harper, eds., *Radical Technology* (Ringwood, Aust.: Penguin, 1976)
soft technology	R. Clarke and D. Clarke, "Soft Technology: Blueprint for a Research Community", *Undercurrents*, #2 (1972); A. Lovins, "Soft Energy Technologies", *Annual Review of Energy*, **3** (1978), 477-517; Autrement, *Technologies Douces*, special edition of *Autrement* (Paris), #27 (October 1980); C. Norman, *Soft Technologies, Hard Choices*, Worldwatch Paper #21 (Washington, D. C.: Worldwatch Institute, 1978);
technology with a human face	P. D. Dunn, *Appropriate Technology: Technology with a Human Face* (New York: Schocken, 1978);

termine correlato	riferimento
utopian technology	D. Dickson, *Alternative Technology and the Politics of Technical Change* (London: Fontana/Collins, 1974);
vernacular technology	I. Illich, "Vernacular Values", *The Schumacher Lectures*, ed. with an introduction by S. Kumar (London: Blond and Briggs, 1980), p. 77;
village-level technology	Lutheran World Service, *Village Technology Handbook* (Geneva: Lutheran World Service, 1977).

La definizione di Willoughby è comprensiva della maggior parte delle idee implicite nei termini correlate riportati in tabella.



«Intendo per **convivialità** il contrario della produttività industriale. La **società conviviale** è una società che dà all'uomo la possibilità di esercitare l'azione più **autonoma** e **creativa**, con l'ausilio di **strumenti** *meno controllabili da altri* ed *efficaci*.»

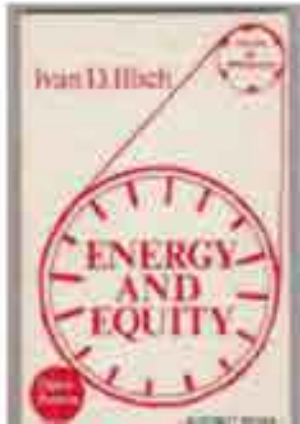
«Lo **strumento** è **conviviale** nella misura in cui ognuno può utilizzarlo, senza difficoltà, quando e quanto lo desideri, per scopi determinati da lui stesso. L'uso che ciascuno ne fa non lede l'altrui libertà di fare altrettanto; né occorre un diploma per avere il diritto di servirsene. Tra l'uomo e il mondo, è **conduttore di senso, traduttore di intenzionalità**.»

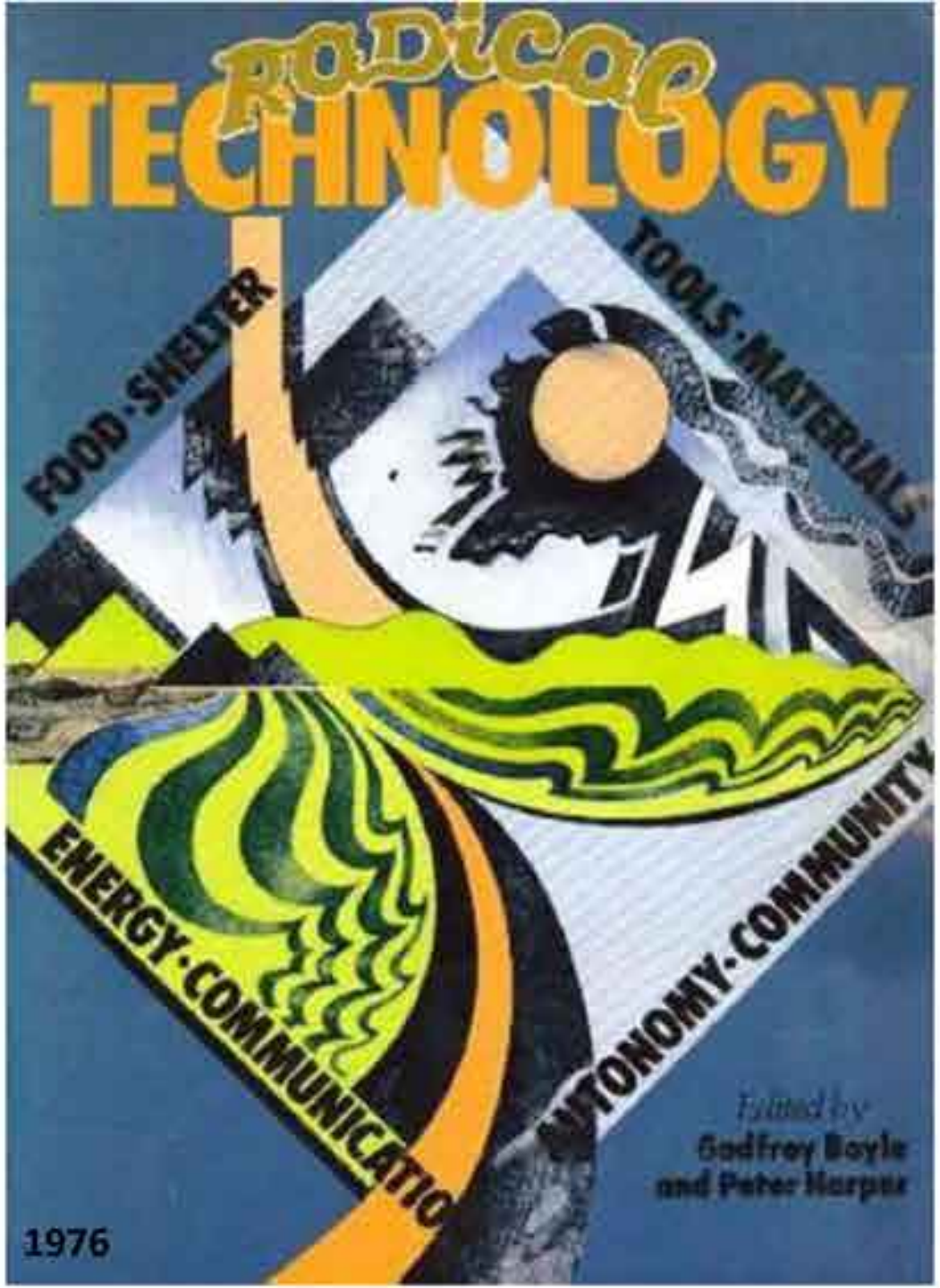
- **strumento maneggiabile** ad energia metabolica;

- **strumento manipolabile** alimentato da energia esterna;

Ivan Illich

Vienna, 4 september 1926
Bremen, 2 dicembre 2002





Radical Technology is perhaps an unfamiliar idea. Everyone has heard of 'alternative technology' — which has come to signify solar panels on the roof, windmills in the garden, and cars run off gas from chicken manure.

Radical Technology encompasses much that is meant by 'alternative technology' but sees these new, liberating tools, techniques and sources of energy as part of a restructured social order, and aims to place them directly in the hands of the community.

Radical Technology is a contribution to the wider dialogue on alternative policies, economics, work-patterns and life-styles, all the more urgent in a deepening global crisis of resource supply and ecological stability, at a time when demands for economic justice, self determination and meaningful work can no longer be denied. *Radical Technology* is not just a way for the middle class to trim its central heating bills.

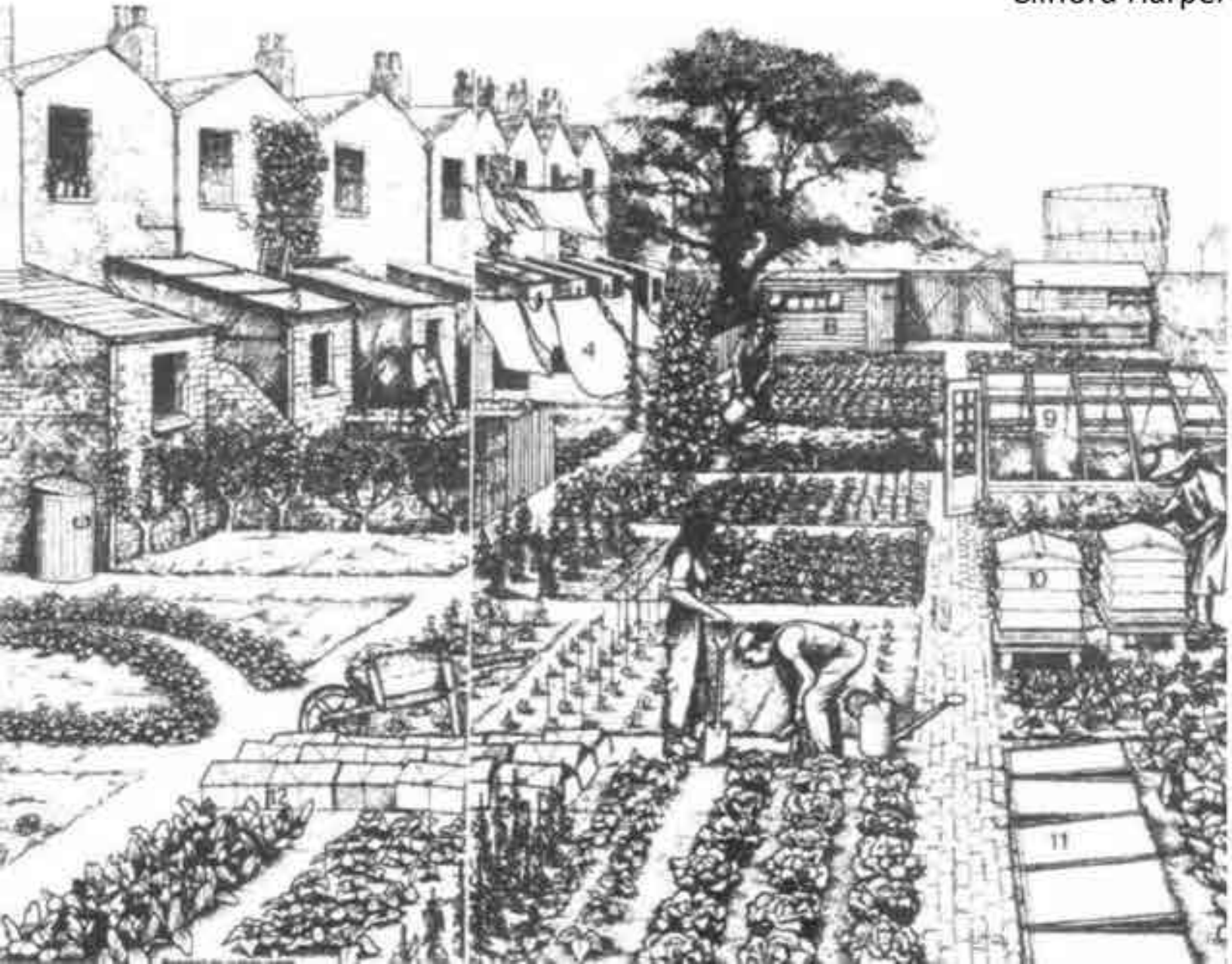
FOOD
SHELTER
TOOLS
MATERIALS
ENERGY
COMMUNICATION
AUTONOMY
COMMUNITY

"The important thing is to work on all fronts at once, the home, the neighbourhood and the workplace. Such a balance is the essence of utopian strategy. Likewise we must be realistic and full of fantasy, attend to public needs and individual consciousness, create a balance of mental and manual work for everyone, a mixture of city and country life, focus on immediate problems and build for the future, live in current and just for fun, conform and be in control. Have our cake and eat it? compromise. Have our cake and eat it?

Why not?

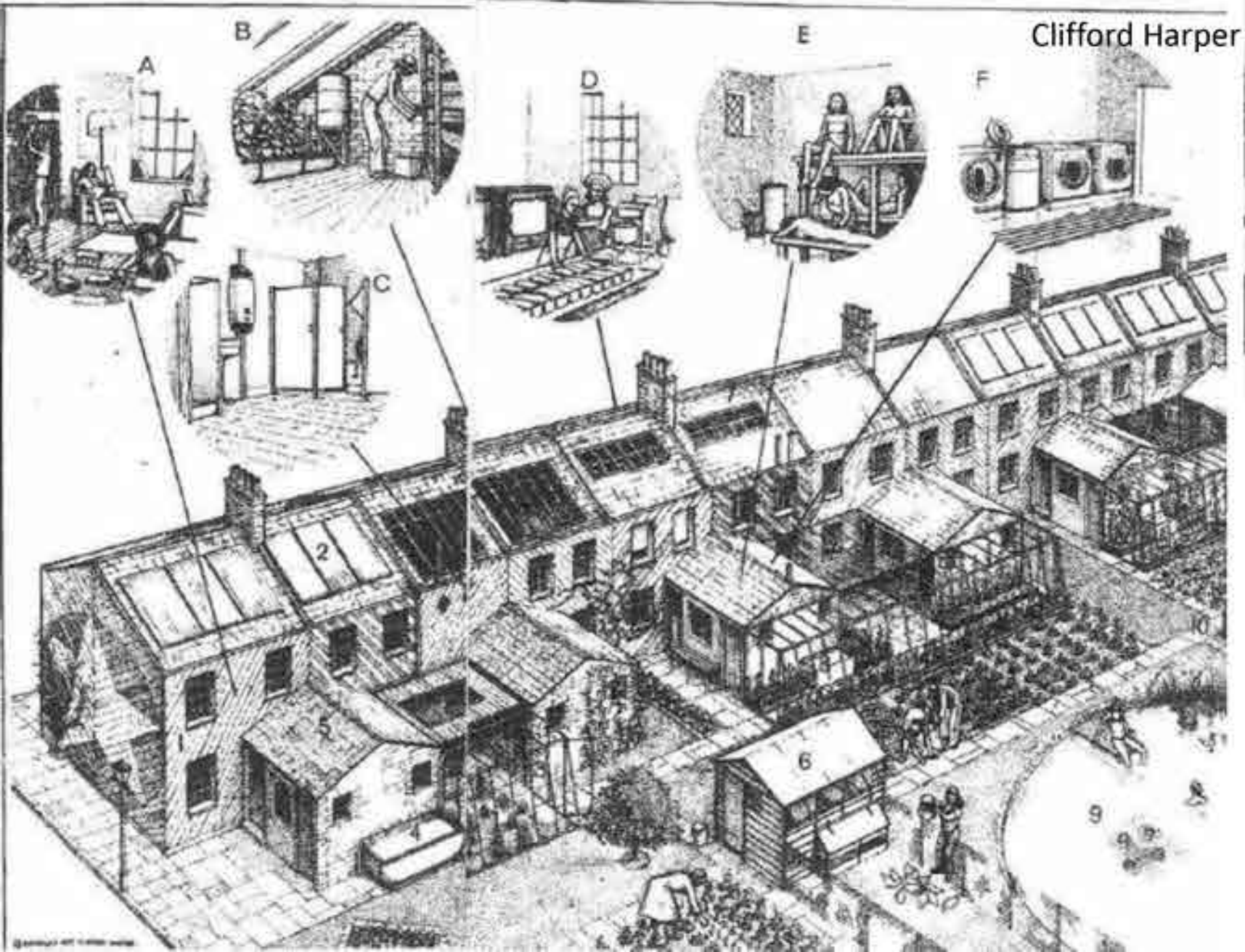
VISION 1/COLLECTIVISED GARDEN

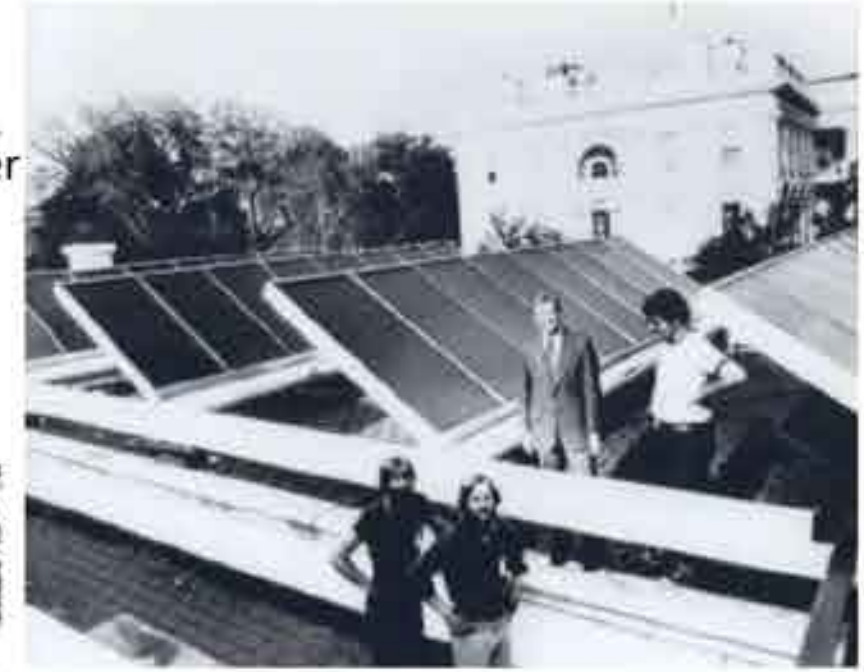
Clifford Harper



VISION 4/AUTONOMOUS TERRACE

Clifford Harper





June 20, 1979, President Jimmy Carter inspected new White House solar hot water heating system

Hot Water

WITHOUT FIRE
WITHOUT COST
WITHOUT INCONVENIENCE

A Climax Solar Water Heater

Set on or set into flush with your roof will give you the luxury of hot water without the discomfort of manipulating a stove and heating the interior of your house.

Over 2,000 in use in this locality. Any user will tell you that the heater has more than paid for its cost, and once known is indispensable.

Phone Brown 171

SOLAR MOTOR CO.

238-239 Bradbury Bldg. Los Angeles

DEPARTMENT "B"

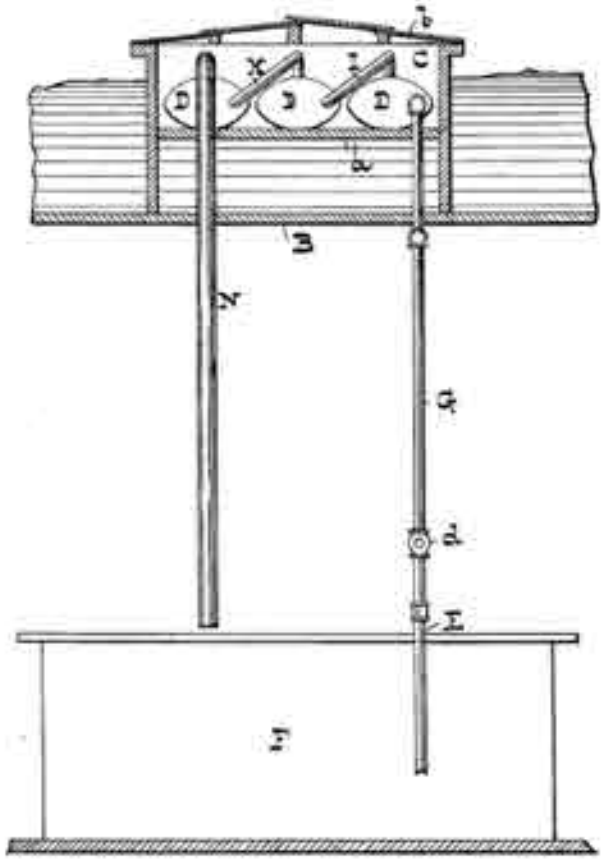
(No Model.) 2 Sheets—Sheet 1.

C. M. KEMP.

APPARATUS FOR UTILIZING THE SUN'S RAYS FOR HEATING WATER.

No. 451,384. Patented Apr. 28, 1891.

Fig 1.



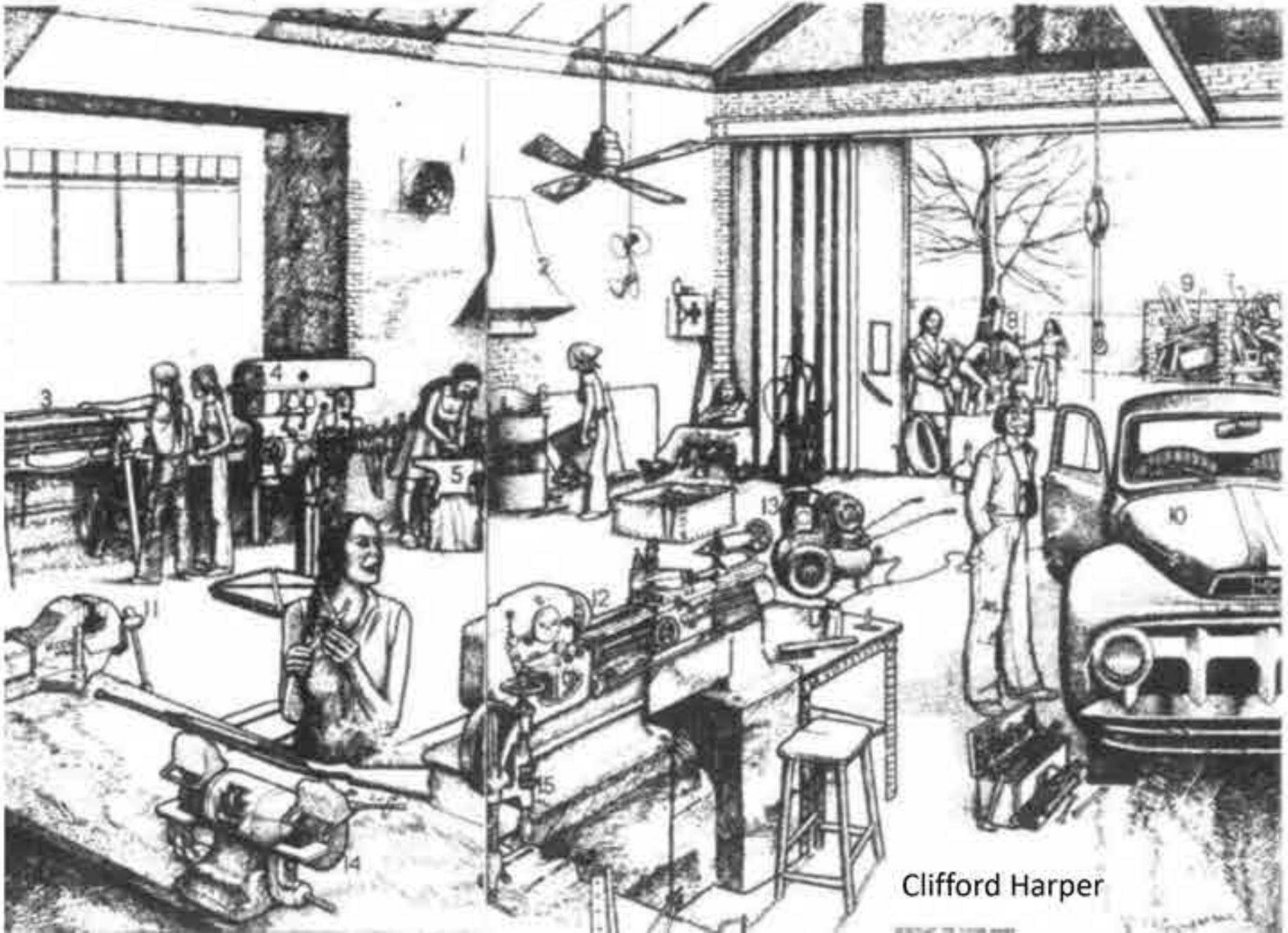
-WITNESSES-

Dan'l Fisher
Geo. E. Taylor

-INVENTOR-

Clarence M. Kemp,
by G. H. W. Howard,
Atty.

VISION 5/COMMUNITY WORKSHOP



MIT D-Lab designing for a more equitable world

Approach

- Creative Capacity Building (CCB);
- Co-Design Summits;
- Innovation Centers;
- Innovation & Entrepreneurship Ecosystems
- International Development Design Summits

- ✓ essere **controllabili dalla comunità** di riferimento;
- ✓ impiegare **competenze locali**;
- ✓ essere **gestibile da singoli o piccoli gruppi**;
- ✓ preferire il **lavoro collettivo** anziché singolo;
- ✓ essere orientate anche allo **sviluppo sociale**;
- ✓ presentare elevata **adattabilità** a un **contesto sociale**;
- ✓ essere implementabili con **semplicità organizzativa**;
- ✓ essere di **piacevole utilizzo**;
- ✓ produrre ciò che è strettamente necessario con **processi piacevoli e creativi**;
- ✓ produrre ciò che è determinato dai bisogni in un'ottica di consapevole **frugalità**;
- ✓ basarsi sulla **capacità delle persone** (anziché su macchinari automatizzati);
- ✓ essere declinate **localmente**;
- ✓ rafforzare la **coesione sociale**;
- ✓ essere ad **alta intensità di lavoro**;
- ✓ innestarsi, laddove possibile, su **tecnologie tradizionali** appartenenti alla **cultura locale**;
- ✓ essere compatibile con la **cultura e le pratiche locali**;
- ✓ soddisfare i **desideri e le esigenze locali**;

- ✓ essere **semplici**;
- ✓ essere semplici da **costruire, mantenere, far funzionare;**
- ✓ impiegare **risorse materiali locali**;
- ✓ essere **comprensibili**, **controllabili** e **mantenibile** dagli utilizzatori;
- ✓ essere **accessibili** a tutti gli utilizzatori;
- ✓ essere **durature,** e richiedere **poca manutenzione;**
- ✓ essere **flessibili**;
- ✓ garantire una **produttività** adeguata;

- ✓ avere un **basso costo** (*affordable*);
- ✓ richiedere un **basso investimento** di capitale per ogni **posto di lavoro**;
- ✓ avere un **alto potenziale occupazionale**;
- ✓ richiedere un **basso investimento** di capitale per **unità di prodotto**;
- ✓ usare **risorse finanziarie locali**;
- ✓ diminuire il **costo** del **prodotto finale;**
- ✓ essere applicabili su **piccola scala**;
- ✓ non richiedere **spese di consulenza**, **tasse d'importazione**, **costi di consegna**, **oneri finanziari**, **costi brevettuali**;
- ✓ evitare l'uso di **brevetti** e di **diritti d'autore**;

- ✓ essere **ecologiche**, **ecocompatibili**, **rispettose dell'ambiente, corrette ecologicamente** (*evironmentally and ecologically sound*);
- ✓ utilizzare preferibilmente **energia rinnovabile** anziché combustibili fossili;
- ✓ non richiedere elevata **concentrazione di energia**;
- ✓ avere **elevata efficienza** energetica;
- ✓ **non essere invadenti** nei confronti dell'ambiente naturale;
- ✓ essere parsimoniose nell'uso delle **risorse naturali**;
- ✓ essere **frugali** nell'uso di **risorse scarse**;
- ✓ facilitare processi **autodidattici** finalizzati alla **consapevolezza ambientale**;

innovazione informale e diffusa

pulitrice di castagne

separatrice foglie origano

co-progettazione/autocostruzione

Lit de Travail, agevolatore agricolo a pedale

Aggrozouk, mini-trattore a pedalata assistita

tecnologie appropriate open source

The case for open source appropriate technology

Joshua M. Pearce

Environment, Development and Sustainability
A Multidisciplinary Approach to the Theory and Practice of Sustainable Development

ISSN 1387-585X
Volume 14
Number 3

Environ Dev Sustain (2012) 14:425–431
DOI 10.1007/s10668-012-9337-9

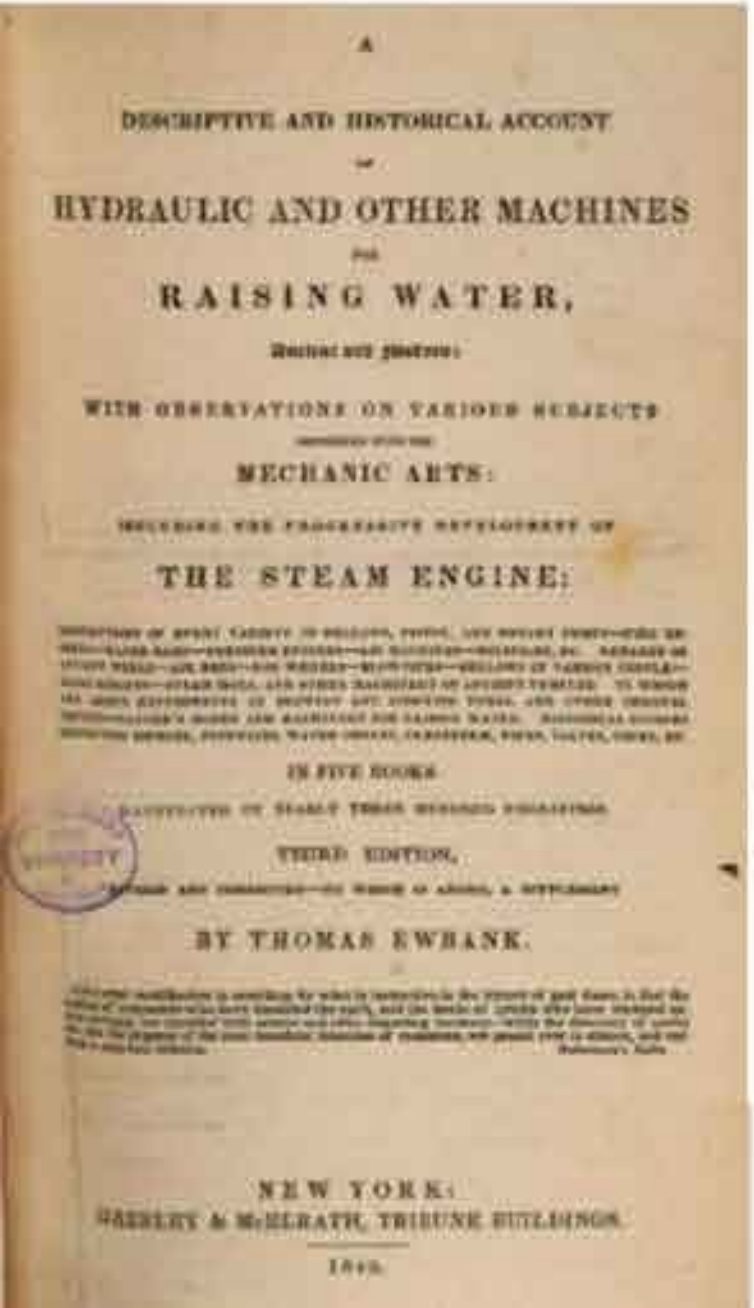
Springer

https://www.opensourceecology.org/

retroinnovazione/ibridazione tecnologica/redesign

Barsha Pump - A Hydro-Powered Waterwheel empowering people Award Winner 2016, Siemens|Stiftung.

retroinnovazione/ibridazione tecnologica/redesign



A

DESCRIPTIVE AND HISTORICAL ACCOUNT

OF

HYDRAULIC AND OTHER MACHINES

FOR

RAISING WATER,

WITH OBSERVATIONS ON VARIOUS SUBJECTS

MECHANIC ARTS:

THE STEAM ENGINE:

IN FIVE BOOKS.

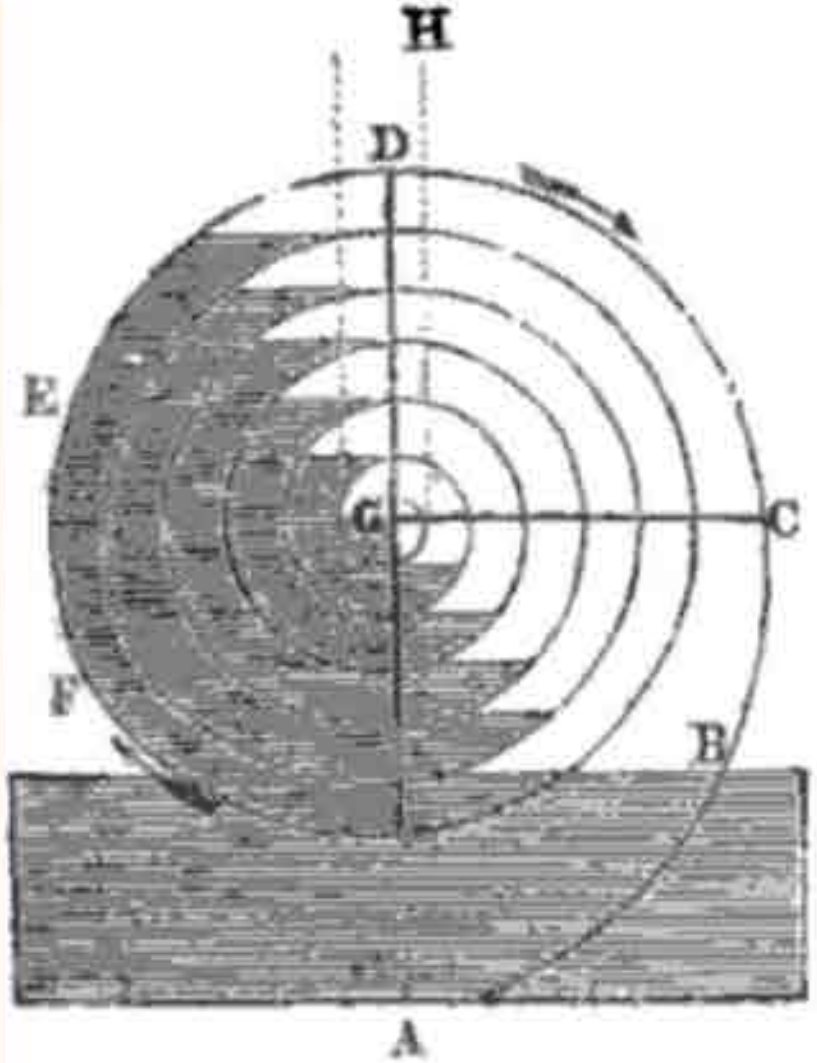
THIRD EDITION,

BY THOMAS EWBANK.

NEW YORK:

GREELEY & McELRATH, TRIBUNE BUILDINGS.

1842.



No. 165. Section of Wirtz's Pump.

No. 166. View of Wirtz's Pump.

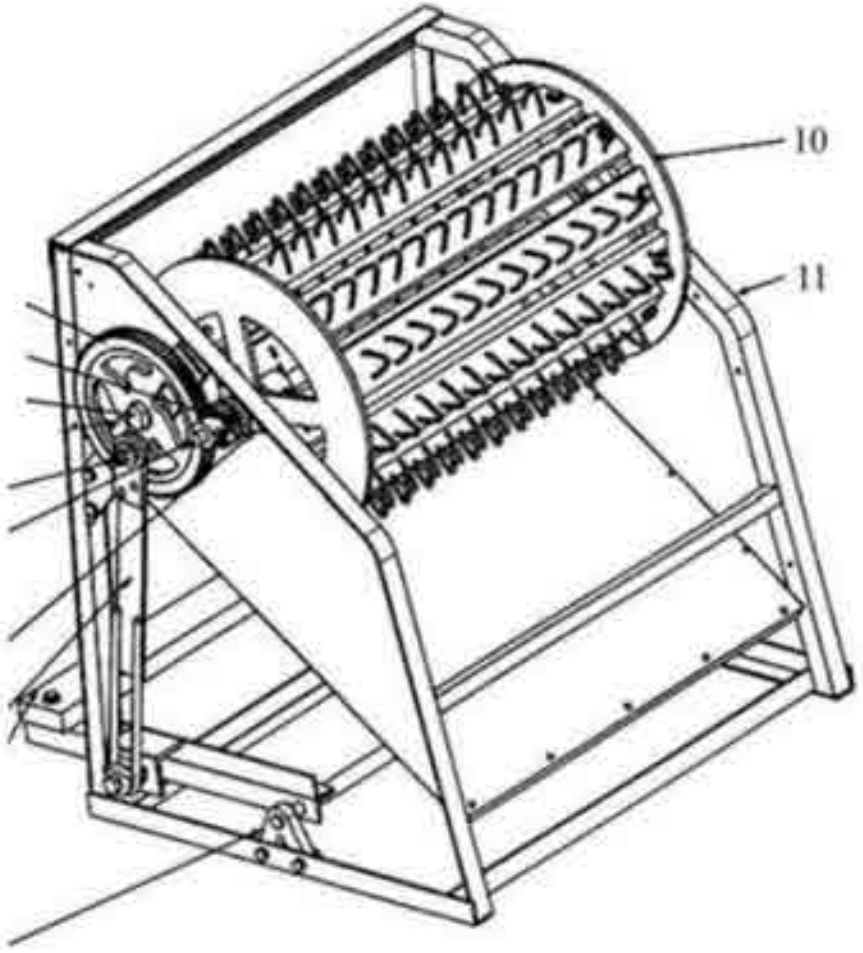
low tech

78 March, 2013 Agric Eng Int: CIGR Journal Open access at http://www.cigrjournal.org Vol. 15, No.1

Effect of thresher drive linkage design on human physiological workload of a pedal operated thresher

K. N. Agrawal[1*], E. V. Thomas[2], K. K. Satapathy[3]

(1. *Central Institute of Agricultural Engineering, 462038 India;*
2. *Indian Institute of Technology, Kharagpur 721302, India;*
3. *National Institute of Research on Jute and Allied Fibre Technology, Kolkata 700038, India*)

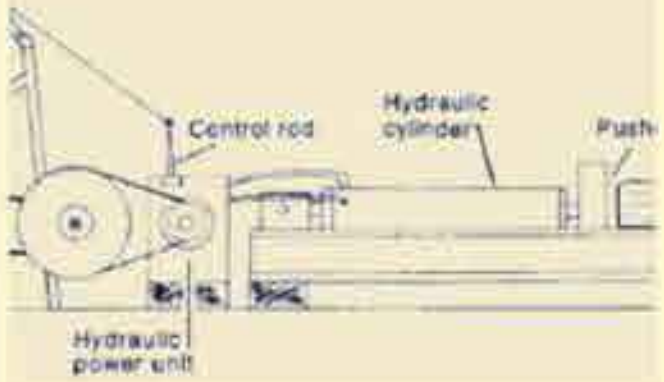


low-tech anpilpay2.0@Polito

ASF ITALIA - PIEMONTE
Architetti Senza Frontiere

LOW←TECH MAGAZINE

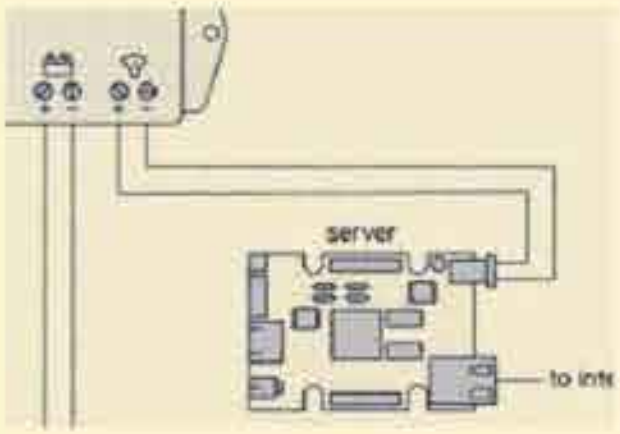
Volume II



Pedal Powered Farms and Factories: The Forgotten Future of the Stationary Bicycle

The possibilities of pedal power largely exceed the use of the bicycle.

May 25, 2011



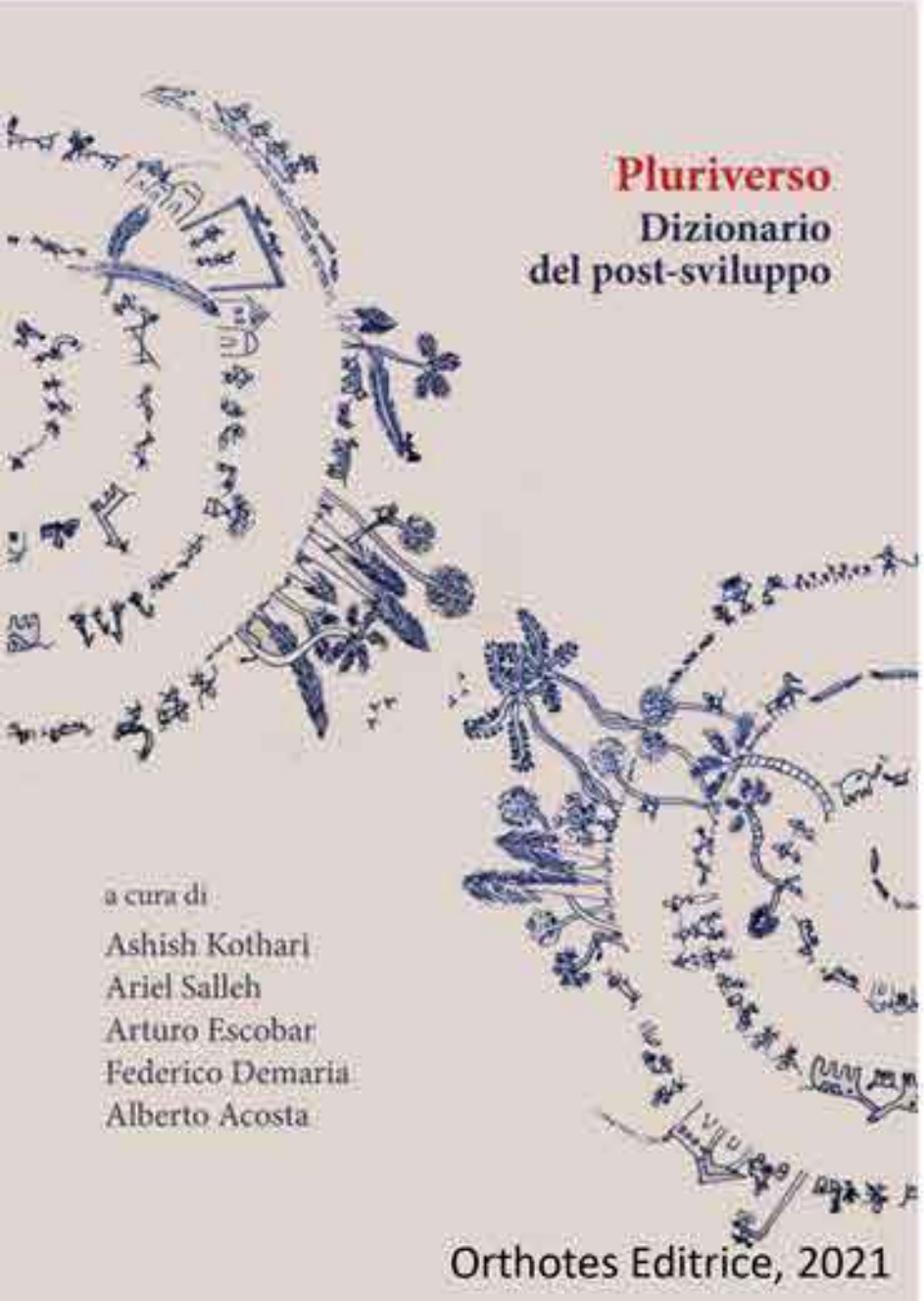
How Sustainable is a Solar Powered Website?

We present our website's energy and uptime data, calculate the embodied energy of our configuration, consider the optimal balance between sustainability and server uptime, and outline possible improvements.

2012-2018

KRIS DE DECKER

pluralità tecnologica



diversità
resilienza
autonomia
semplicità
sufficienza
sobrietà
inclusività
giustizia
equità
cura
dignità
(del lavoro)

Teaching Appropriate Technologies with the Applied Mechanics Approach to Sensitize Students to Their Future Role in Environmental Sustainability and Social Justice

Walter Franco(✉)

Department of Mechanical and Aerospace Engineering, Politecnico di Torino, Turin, Italy
walter.franco@polito.it

Abstract. Historically, the engineering courses tend to emphasize the purely technical aspects, reinforcing in students the idea of the duality between technology and society. Appropriate Technologies (ATs), being designed starting from the needs of specific communities, can vice versa help students understand their future role in terms of environmental sustainability and social justice. The paper describes the experience of teaching ATs with the Applied Mechanics approach at the Politecnico di Torino.

Keywords: SDG4 · Engineering Education · Industrial Design Education · Humanitarian Engineering · Development Engineering · Social Impact

la didattica-il frullocipede

la didattica- la pedal saw

grazie!

Politecnico di Torino
Department of Mechanical and Aerospace Engineering

AMaLAB
Appropriate Machines Laboratory

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