

USASBE

United States Association
for Small Business and
Entrepreneurship

Humanitarian Engineering & Social Entrepreneurship (HESE)

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Pennsylvania State University





World Class “Engineers” + (Social) Entrepreneurs



convergence

HESE @ Penn State

Teaching

- **13-credit ECE Certificate**
- **Fall semester:**
 - Sensor and Controller System Integration
 - Social Entrepreneurship
- **Spring semester:**
 - Projects in Community Service Engineering
 - Design for Developing Communities

Research

- **IJSLE: HESE**
- eplum Assessment
- Systems Thinking
- Cultural Anthropology
- Social networks, trust and cellphones
- Indigenous Knowledge Systems and Sticky Info
- Design Space Exploration
- Changing the Conversation

Engagement

- **Mashavu**
- **WishVast**
- **Essential Design**
- **iSPACES**
- **HESE - India**
- Invention 2 Venture Conference
- Milking the Rhino: ISS
- Kochia Chronicles
- AcademIK Connections
- *K-12(Center for Science in the Schools)

Goal: Sustainable Value Creation

**Technologically
Appropriate**

**Socially
Acceptable**



**Environmentally
Benign**

**Economically
Sustainable**



the ventures →



ESSENTIAL DESIGN

Renewable Energy Solar Driers Anaerobic Digesters

Wastewater Management Water Filtration Systems

Briquetting Machines Water Well Drilling Rigs







Effluent Pipe

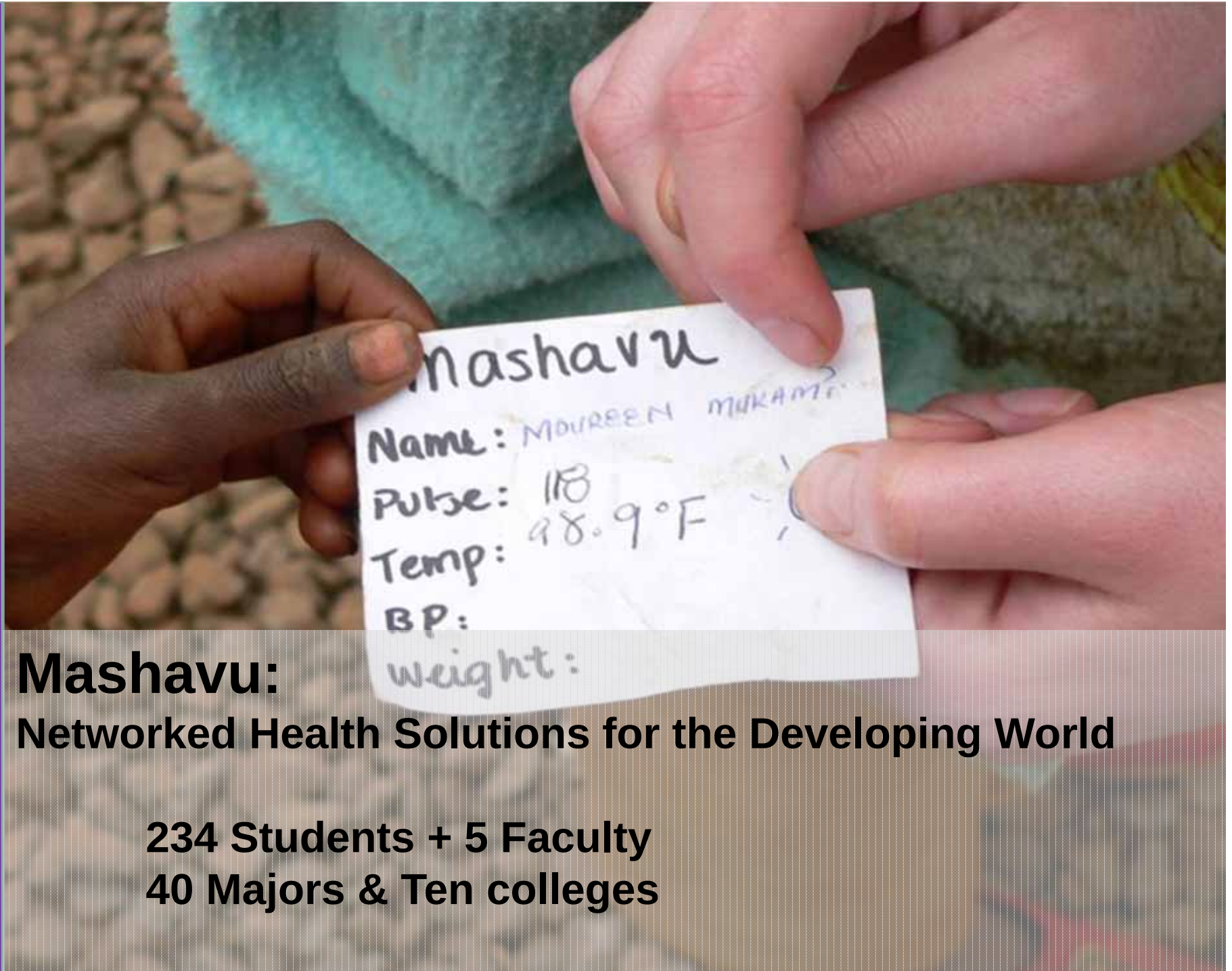
Seeding







Livelihood for Former Street Youth



Mashavu:

Networked Health Solutions for the Developing World

234 Students + 5 Faculty

40 Majors & Ten colleges

Healthcare Crisis: Focus Africa

NUMBER OF INHABITANTS PER DOCTOR





MASHAVU FOR OPERATORS

STEPHEN SUFFIAN

GENDER: MALE
AGE: 25

CITY: WASHINGTON
COUNTRY: USA

PATIENT ID: 1

PHONE: 214-242-2424



New Patient
Patient Lookup
New Prescription (2)
Child's Information (2)
Data Interface
Logout

Search

Name:

ID:

Passcode:

Stephen

Stephen Suffian	Patient ID: 1	Last Case: 9/1/2010
Stephen Segal	Patient ID: 4	Last Case: 9/1/2010
Stephen Hawkins	Patient ID: 6	Last Case: 9/1/2010

CONSULT YOUR DOCTOR

KNOW YOUR NUMBERS

SUMMARY/HISTORY

PROFILE UPDATE



MASHAVU FOR DOCTORS

CONSULTATIONS

New Patient (2)
Patient Lookup (2)
New Prescription
Child's Information
Data Interface
Logout

Khanjan Mehta ID#: 2 Case#: 1 1:04 PM 9/3/2010



Kirk Greenwood ID#: 4 Case#: 2 2:19 PM 9/3/2010



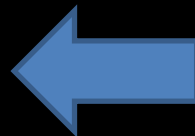
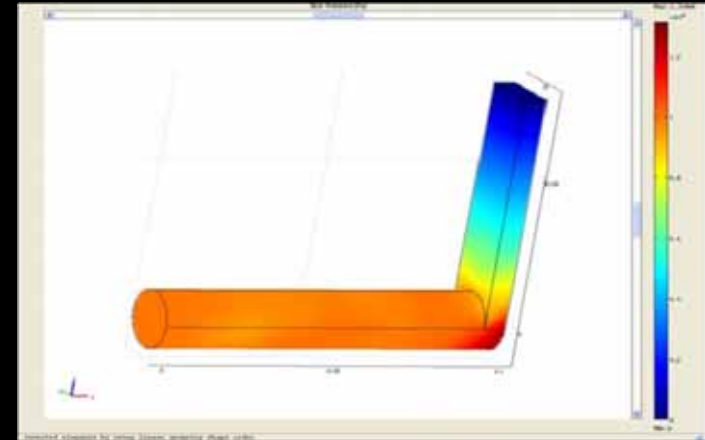
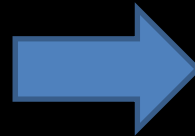
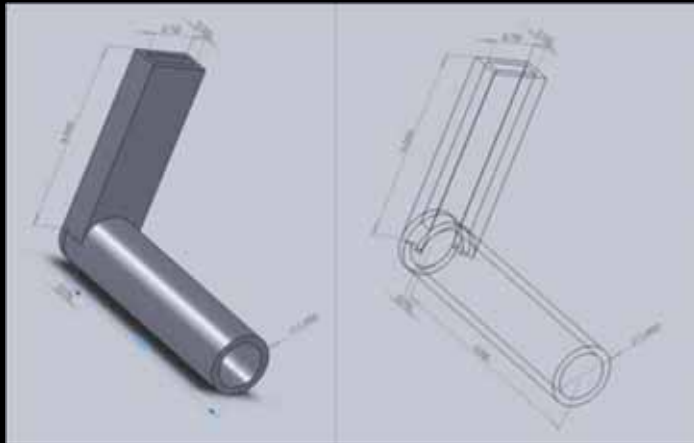
Joe Paterno ID#: 3 Case#: 1 12:02 PM 9/3/2010



Stephen Suffian ID#: 1 Case#: 3 2:19 PM 9/3/2010



Radical Design for Context



Mashavu \$10 Biomedical Devices

Spirometer



(Lung capacity)

Pulse Oximeter



(O₂ Saturation in Blood
and Pulse)



**Blood Pressure
Cuff**



Stethoscope



MASHAVU

NETWORKED HEALTH SOLUTIONS FOR THE DEVELOPING WORLD

PENNSTATE



WISHVAST +1

(THIS IS NOT AN IMPROVED EXPLOSIVE DEVICE. TEST ME.)

DO NOT UNPLUG
POWER OR PHONE

WishVast

Building Trust and Social Capital using Cell Phones

Beta-tested in Kenya; Pilot Testing in South Africa



Every **6** Months: **33%** salary on new job



**iSPACES:
Rethinking Science Education in Tanzania
Bachelors of Education (Science) Degree
Science, Systems and Entrepreneurship**





**Project Prerana + Mpower
ICT Solutions for Women's Education**

Affordable Technologies for Maternal Health



the big picture →

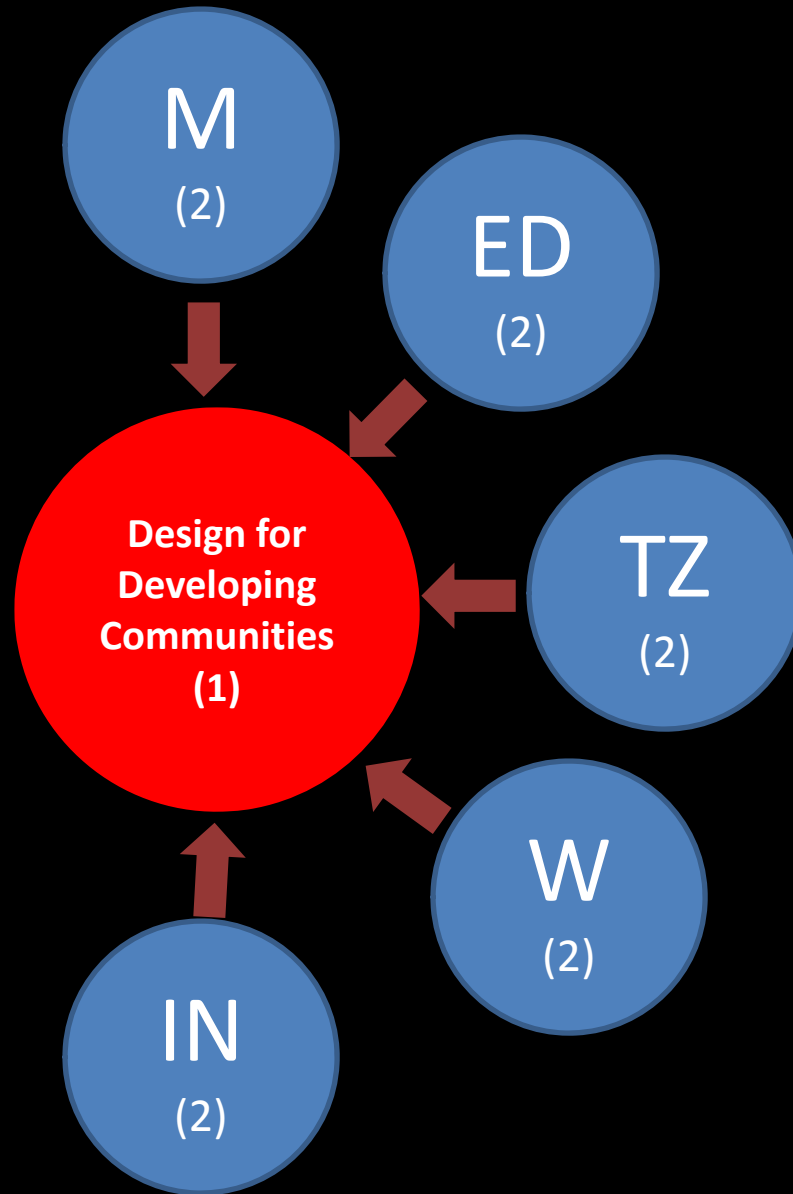
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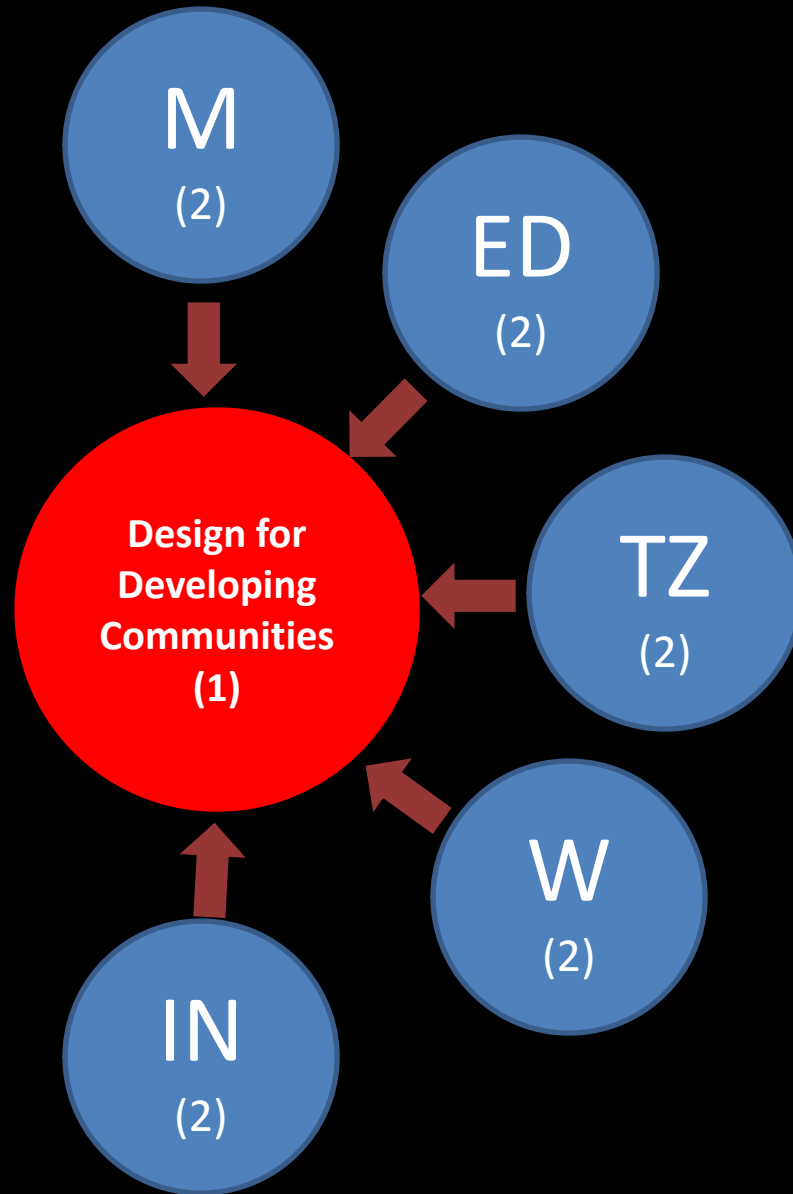
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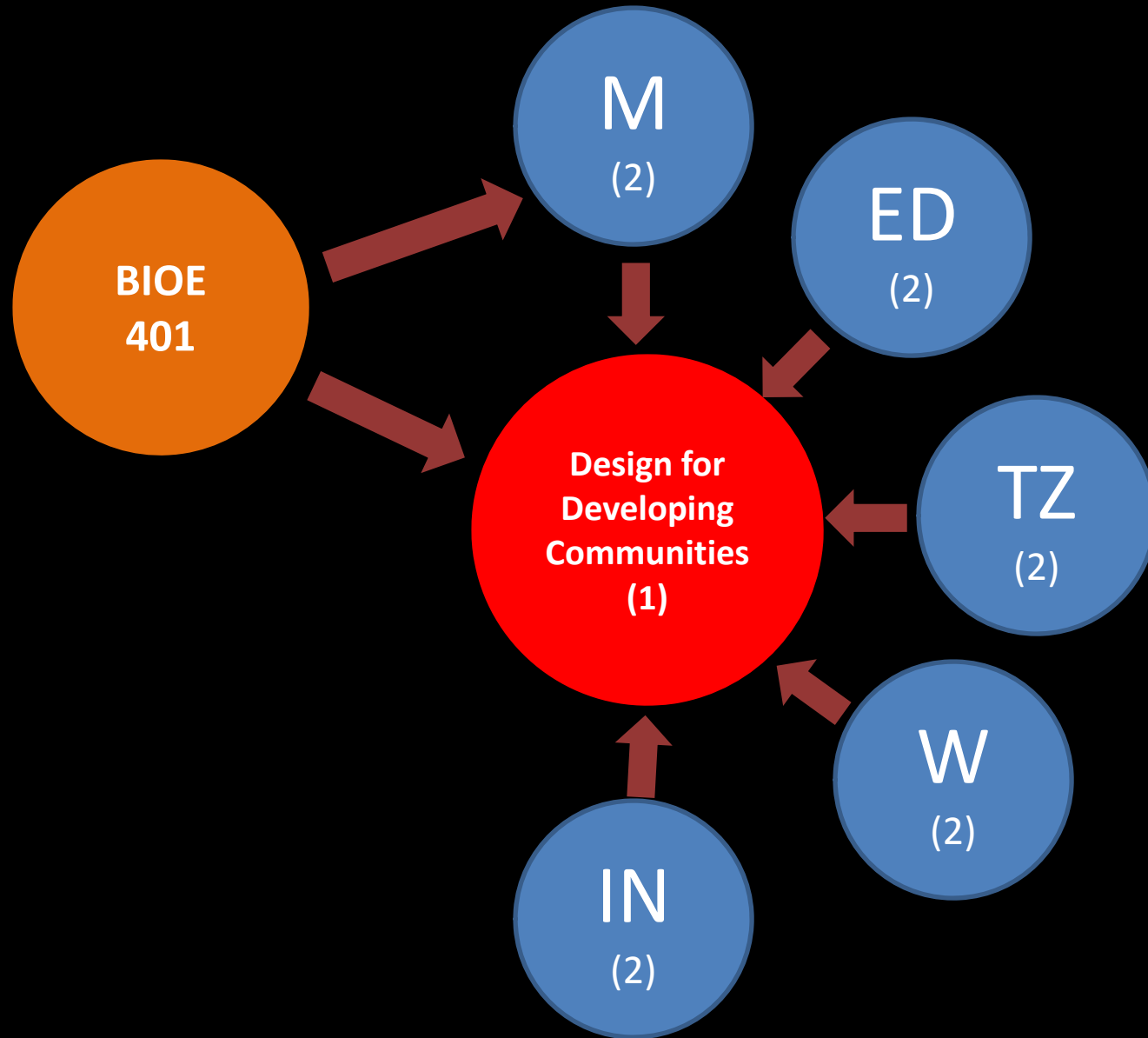
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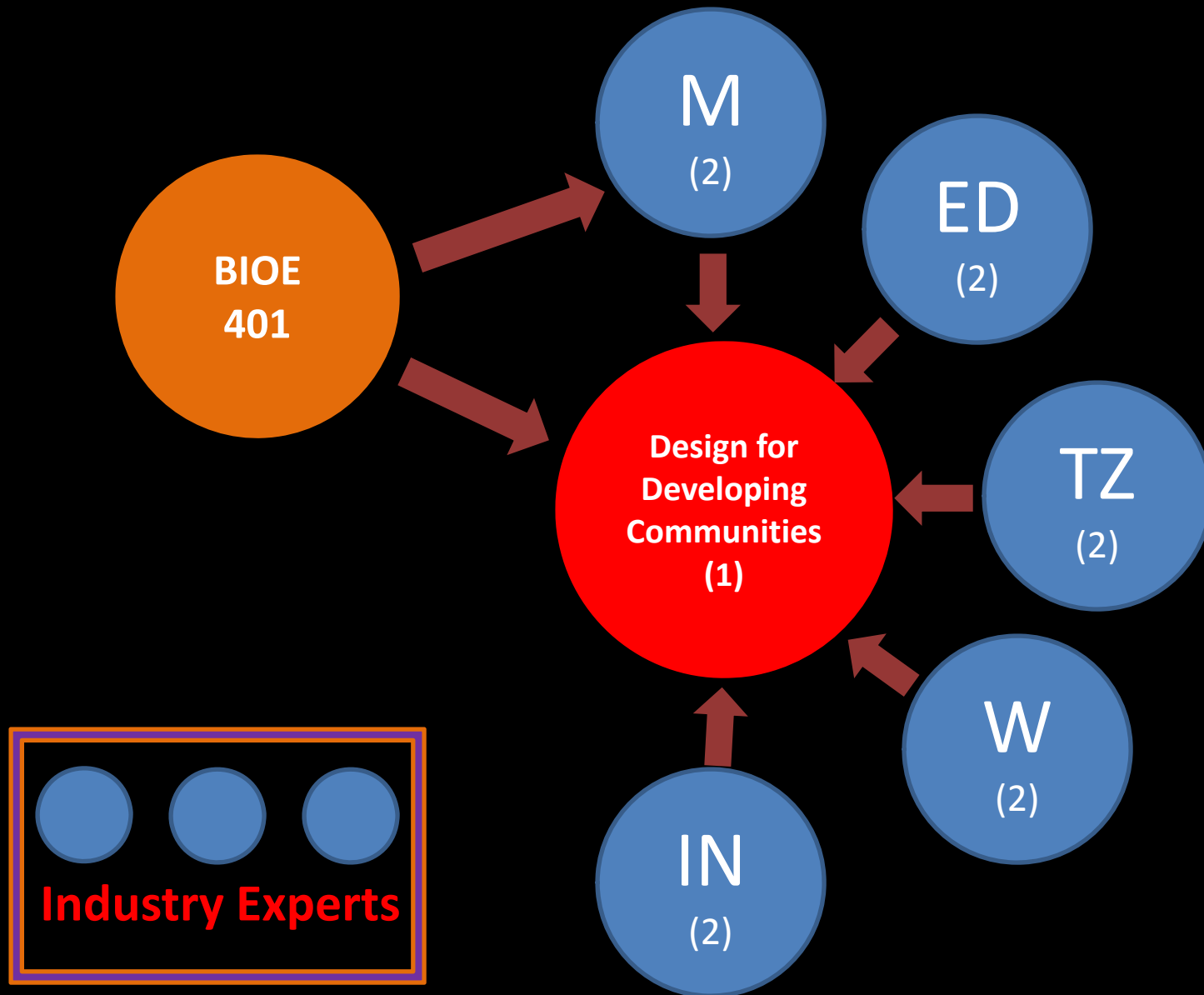
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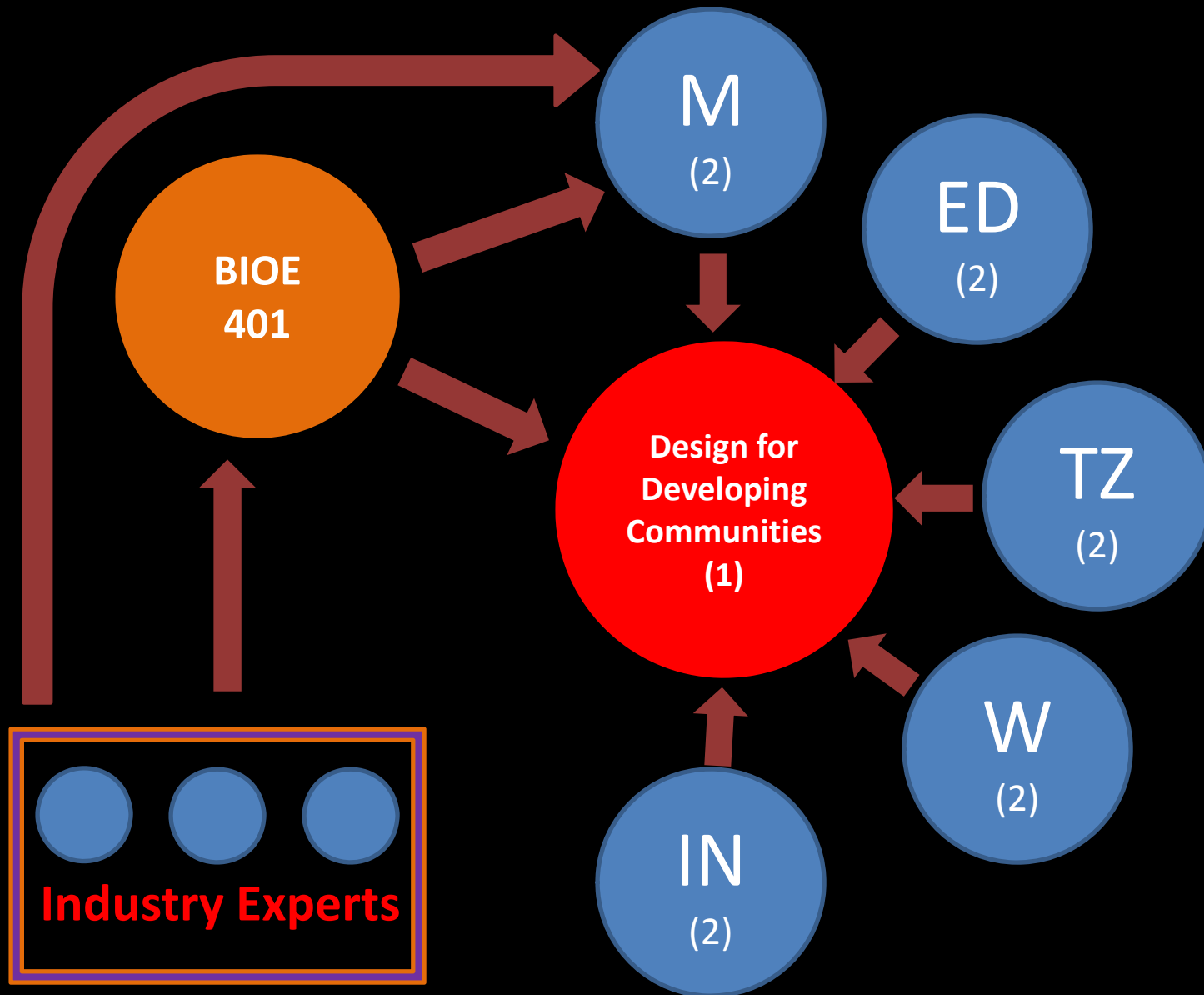
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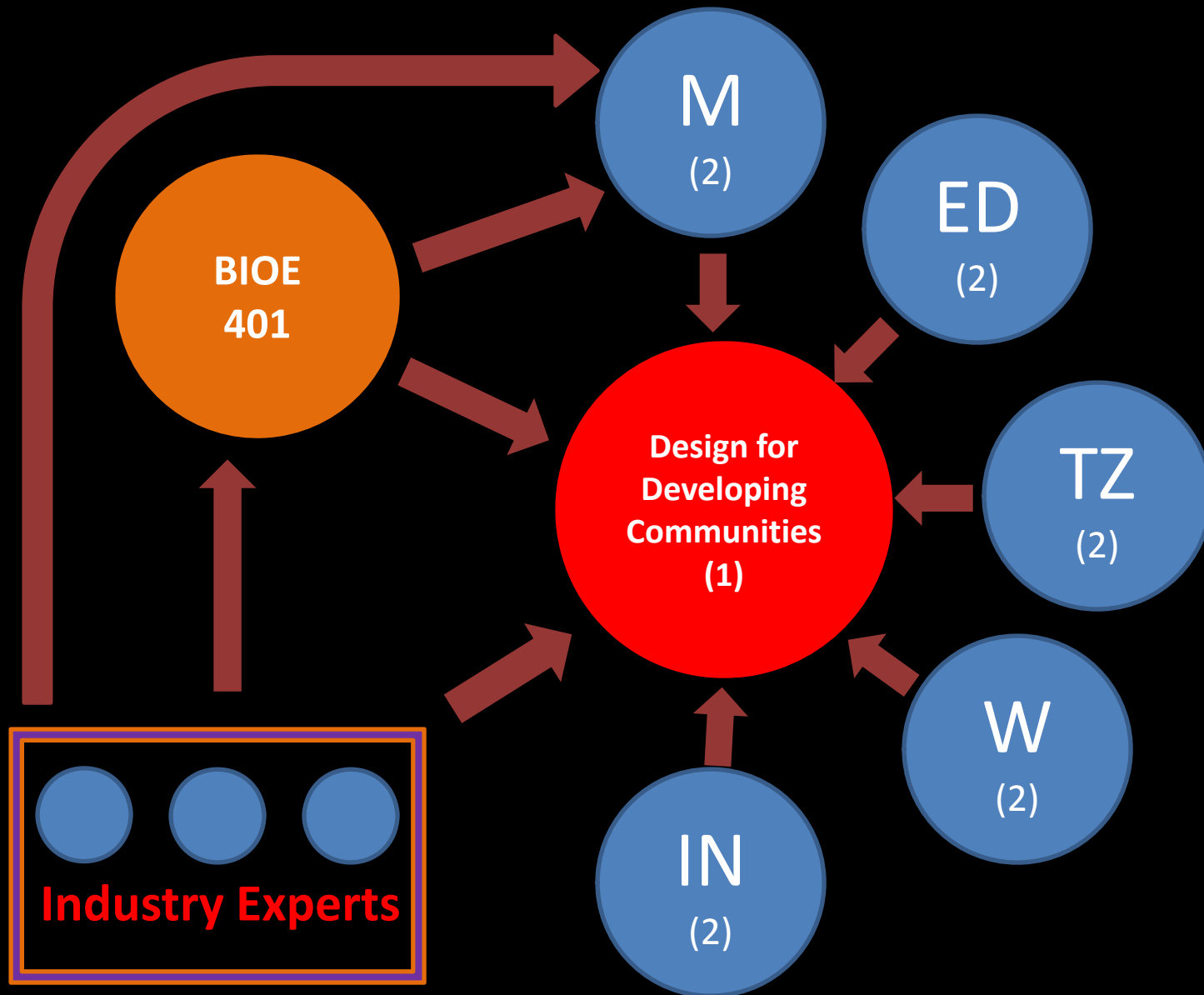


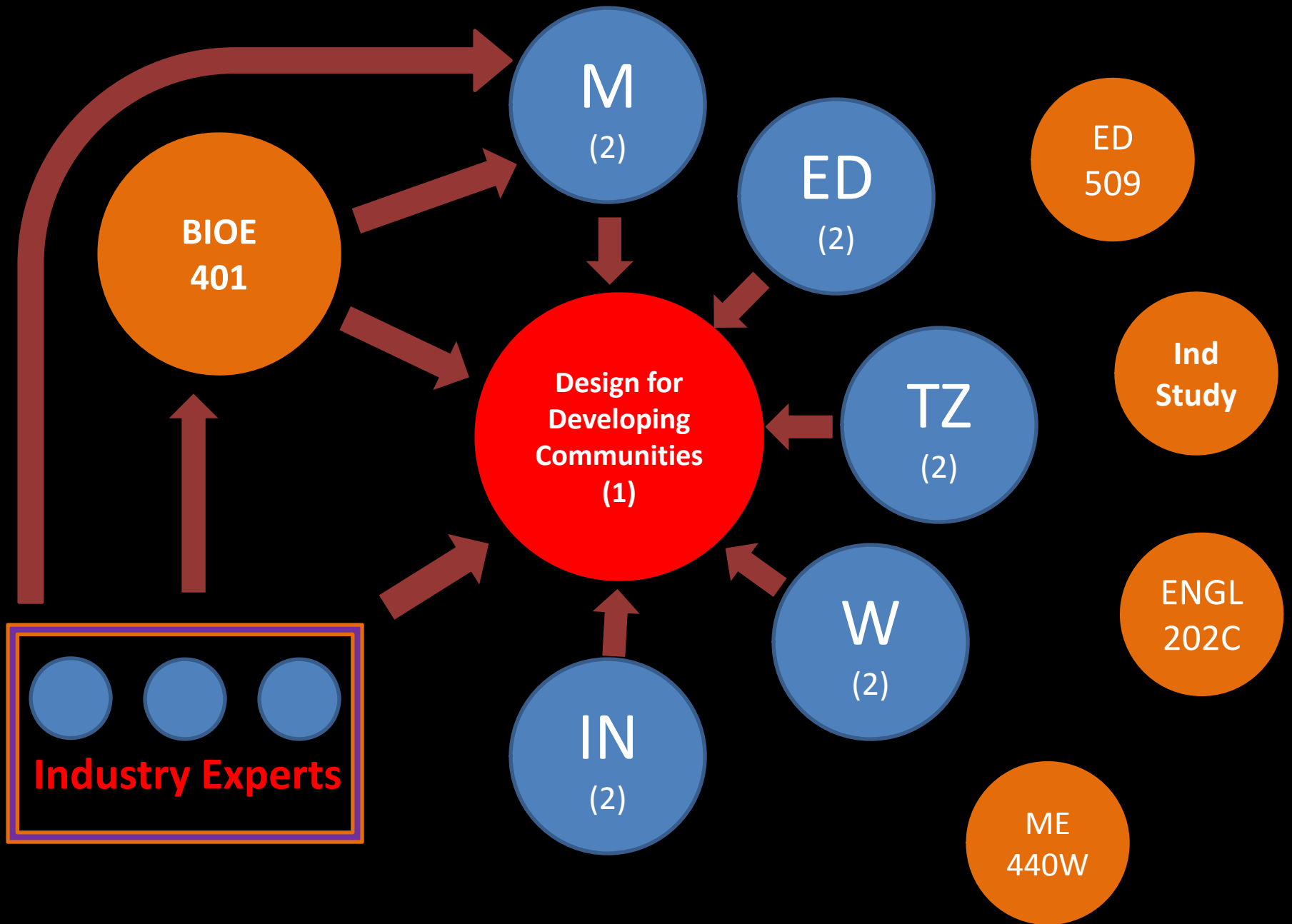












Numerous concepts and disciplines

Several countries and cultures

Many forms of engagement

One goal...

World class engineers and entrepreneurial global citizens to build
a *freer, fairer, friendlier* and more sustainable planet

Out of Many, One...

... **E Pluribus Unum**...

... **eplum.**

Fieldwork: Real; Rigorous; Intense



HESE Facts

- ~500 students engaged in 2010
- eplum model: 10 classes; 50 majors; 10 colleges
- Funding (5 years): 500K grants + 75K Eqpmnt
- Larger grants
 - 200K: Creative Campus Grant, Doris Duke Foundation
 - NSF STEP
- Active collaborations across MOST colleges

Sustainability: Solutions



Frugal Engineering

Systems Thinking

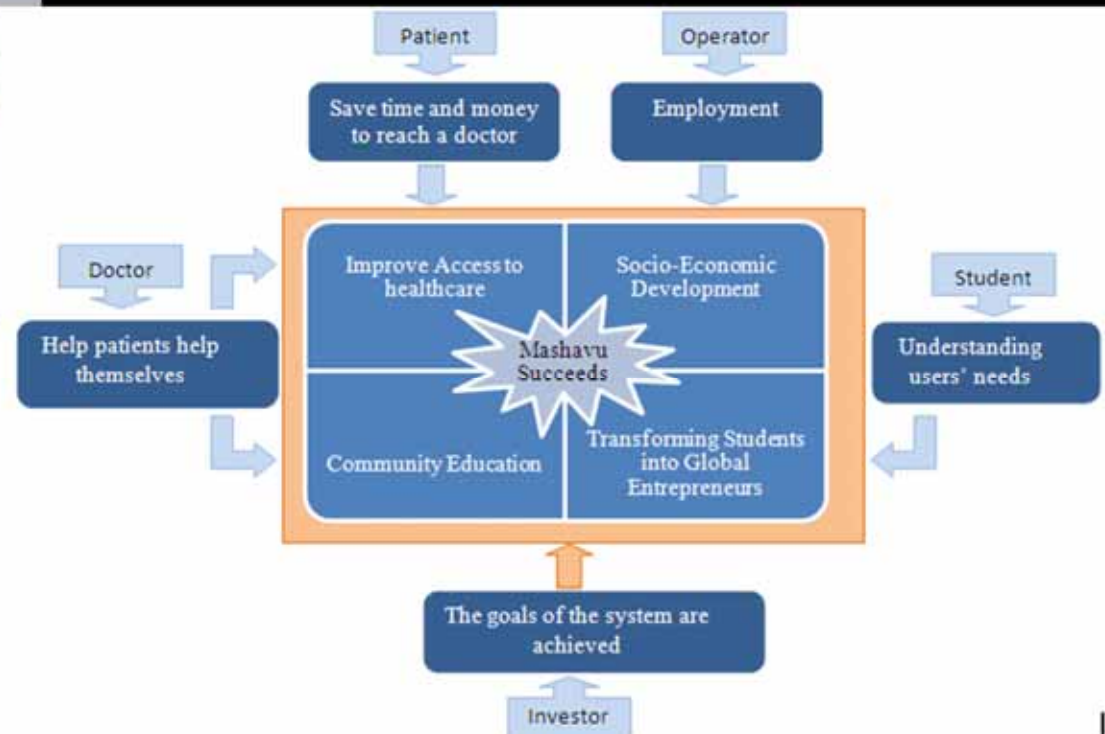


Figure 9: Goals of the various stakeholders of the Mashavu system

Sustaining & Scaling: Program/Ventures

Innovative Partnerships



Sustainability: Program



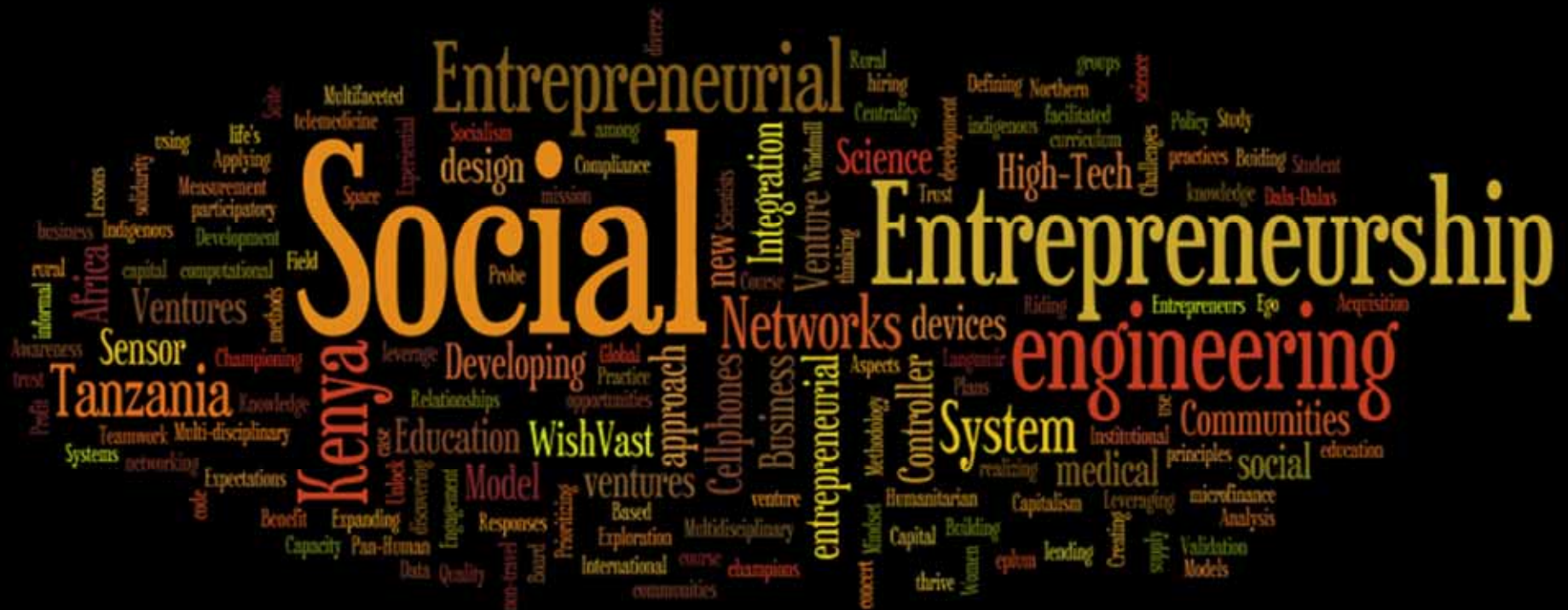


Transferability: Program

- Developing Program is an Organic Process
- Program Models, Pedagogies, Logistics, Mechanics, Methodologies are published
- Several resources are available online
 - Design for Developing Communities Seminars
 - AcademIK Connections Video Series
 - Milking the Rhino Showcase Entries
 - “How-to” papers on various topics
 - Catalogued HESE resource portal

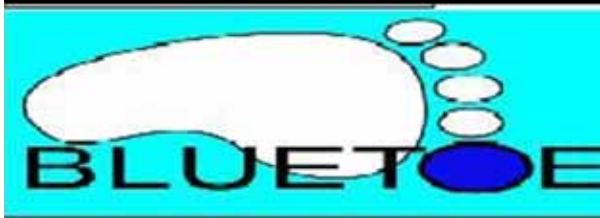
Impact: Research

Applied Science, Designs, Methodologies, Curricular Models Lessons Learned & Resources



22P; 1R; 7M; 11D

Impact: Real Value + Capacity Building



OLOSHO-OIBOR ENERGY CENTER for Business Promotion

Managed by
Ewangan-O-Olosho-Oibor CBO

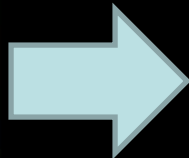
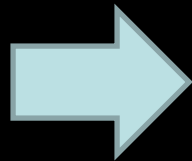
BUSINESS SERVICES

- LED Lamp Assembly
- Charging LED Lamps,
- Mobile phones, car batteries.
- Computer Training / Internet / Email
- Posho Mill
- Soap Making

Renewable Energy (Wind, Solar Hybrid) Powering,
Oloshoibor Primary School and Health center



Transferring Programs



Impact: Partnerships



JIMMY & ROSALYNN CARTER PARTNERSHIP FOUNDATION
FOSTERING CAMPUS-COMMUNITY PARTNERSHIPS FOR ACADEMIC SERVICE AND LEARNING



Impact: Education

Core Team

- Global awareness, social entrepreneurship
- Self-reported multidisciplinary teamwork

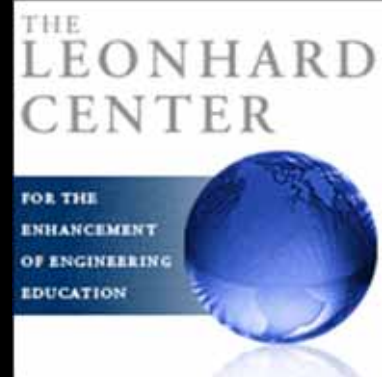
Upper Level Classes

Global awareness; Teamwork

All Classes

Subject matter knowledge

Schreyer Institute for Teaching Excellence



Impact: Education



Humility; Life Skills; Innovation

Impact: Education

Making universities and engineering schools exciting, creative, adventurous, rigorous, demanding, and empowering environments is more important than specifying curricular details.

Charles Vest
President, NAE
President Emeritus, MIT





HESE: Building Multi-Million Smile Enterprises



Mashavu

Name: MOURBEM MIKATI?

Pulse: 118

Temp: 98.9°F

BP:

Weight:



Mashavu

Name:

Pulse:

Temp:

BP:

Weight:

