Global Conference on Sustainable Manufacturing (GCSM)

Prof. Dr.-Ing. Günther Seliger

September 16th, 2015
Introduction by Prof. Dr.-Ing. Günther Seliger

13th Global Conference on Sustainable Manufacturing

Website visitors from all over the world
GCSM 2016

South Africa
October 2nd - 9th 2016

Monday, October 3rd
► Paper sessions
► Boat trip

Tuesday, October 4th
► Paper sessions

Wednesday, October 5th
► City / Industrial visit
► Get onto overnight busses
South Africa
October 2nd - 9th 2016

Thursday, October 6th
► Arrive at Augrabies Falls National Park
► Sustainable Communities Challenge
  ► Global Engineering Teams
  ► Design Thinking approach
  ► Selected key areas

Friday, October 7th
► Develop and Present solutions
► Share Open Design Solutions for Global Challenges
► Overnight buses to Cape Town
Quality of life and consumption of resources

Irresponsible development path:
Wealth for all people relying on present technologies

Responsible consumption of resources

Improving quality of life with a responsible consumption of resources

Acceptable living standard with responsible consumption of resources

Maintaining the quality of life while reducing the consumption of resources

Early industrialised countries

Consumption of resources

Acceptable living standard

Emerging countries

Quality of life
Prosperity for everybody?

- How to design and manufacture products and services
  - opening up hungry markets,
  - avoiding bad investments in saturated markets,
  - increasing human wealth on global level within conditions of ecological resource availability.

- Change in existing process paradigms
  - from economies of scale to economies of scope,
  - to more benefit for more people with less resources.
How can we bridge the gap?

By enabling large scale increases in teaching and learning productivity.
Increasing the teaching and learning productivity

bottom-up approach

- Nations
- Unions
- Industries
- Governmental Organisations
- Big Enterprizes
- NGOs
- Educational Institutions
- Schools
- SMEs
- Governmental Organisations
- Enterprizes
- Educational Institution
- Non-Governmental Organisations
Bridging the gap by leverage of education

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Decoupling Growth from Resource Use

FabLab for Sustainable Manufacturing network

Junior Forscht

European Engineering Teams

Erasmus+

Vietnamese-German University

Global Production Engineering

TU Berlin - VGU

GPE

13th Global Conference on Sustainable Manufacturing
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Wednesday, Sept. 16th
Learnstruments are artefacts demonstrating their functionality to the user automatically.
CubeFactory as a Learnstrument

Learning environment to promote sustainable value creation in areas of insufficient infrastructure.

- Enables user to create sustainable values
- Teaches a closed loop material cycle
- Contains all necessary infrastructure for production

**Manufacturing:** Open Source 3D printer as sustainable machine tool to create values and as an instrument for learning

**Energy supply:** Off-grid power supply by detachable high-efficient solar panels (200W/m²)

**Energy storage:** Lithium iron phosphate (LiFePO₄) battery with high power density

**Renewable resources**
- PLA: biodegradable plastic derived from starch

**Non-renewable resources**
- ABS: recyclable plastic derived from local waste

**Material supply:** Plastic recycler for local available materials to supply 3D printer filament

**Knowledge transfer:** Intuitive learn and control environment to teach sustainable value creation

**www.cubefactory.org**
RecyleBin as a Learnstrument

- Producing 3D printer filament out of domestic plastic waste
- Comparing the cost of 100 kg of sorted plastic waste ($1.00) with 1 kg of 3D printer ABS-filament ($25), an uplift ratio of 2500:1 is realized.

Shredding by manual operation
Grinder hardened steel
Temperature field up to 260°C for a wide range of plastics
Extrudes common plastics like ABS, LDPE, TPE, PLA
Wind turbines as a Learnstrument

- Hands-on-experience: Students can explore the different influences on the energy yield
- Relationship between
  - Wind speed
  - Turbine blade pitch
  - Current
  - Voltage
  - Power
  - Rounds per minute
Solar Manager Game

**Concept:**
- Student groups represent a company
- Companies are in global competition
- PV Modules have to be designed, manufactured and marketed
- Closed material loops become key success factor for the companies

**Learning aims:**
- Raising awareness
  - for increased resource demand
  - for market dynamics
- Students
- develop strategies for material efficiency
- are responsible for company success
Knowledge is the only resource expanded by utilization.
12 Master Students from four European universities working together on sustainable startups
Global Production Engineering (GPE)

- Master of Science in Global Production Engineering
- Launched in 1998, relaunch 2003
- Instruction language: English

- 500 students since 1998
- Education close to industrial requirements

Preparing managers of technology for the requirements of global markets
Intake 2015
DAAD Scholarship 2015 for GPEM Students

1. Research assistants from Chair of Assembly Technology and Factory Management of TU Berlin released master thesis topics for VGU GPEM students

2. Academic Coordinator, Dr. Stammnitz, arranged a competition for the GPEM students at VGU

3. Research visit at TU Berlin for a period of 4 months for the winners of the scholarship

4. Winners of the scholarship at TU Berlin
<table>
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<tr>
<th>TU Berlin Supervisor</th>
<th>VGU Student</th>
<th>Topic</th>
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<tbody>
<tr>
<td>T. Guidat</td>
<td>Tri</td>
<td>Remanufacturing facilities for motorcycle components in Vietnam</td>
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<tr>
<td>J. Seidel Dr. A. P. Barquet</td>
<td>Khanh</td>
<td>Sustainable business models for the manufacturing industry in Vietnam</td>
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<tr>
<td>S. Alnahhal Dr. P. Stammnitz</td>
<td>Dao</td>
<td>Sustainable sanitation in Vietnam</td>
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<tr>
<td>J.G. Steingrímsson M.C. Köse</td>
<td>Suong</td>
<td>Byproduct reuse in Vietnam</td>
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<tr>
<td>B. Muschard Dr. C. Reise B. Müller</td>
<td>Duc</td>
<td>Cyber-physical learning environment for manual workplaces</td>
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Conference Program

Sheet 1

1. Prof. Reiner Anderl
   Technische Universität Darmstadt
2. Prof. I.S. Jawahir
   University of Kentucky
3. Prof. Dirk Bähre
   Saarland University
4. Prof. Rainer Stark
   Technische Universität Berlin
5. Mr. Sanjeev Bahl
   SaiTex Company
6. Mr. Elmar Dutt
   Deutsches Haus Ho-Chi-Minh City
7. Prof. Gunter Pauli
   The Blue Economy
8. Mr. Ryosuke Masumitsu
   Bosch Vietnam

Keynote Speeches

Working Sessions

- 10
- 22

Paper Presentation Sessions
Academic Working Sessions Wednesday 16/09/15

13:00 - 14:30  1  Ms. Ina Roeder  Mr. Bernd Muschard  Solutions and perspectives for the mediation of sustainable manufacturing

13:00 - 14:30  2  Ms. Nicole Oertwig  Mr. Mila Galeitzke  Multi-Perspective Modelling of Sustainability Artefacts

15:00 - 16:30  3  Mr. Samir Alnahhal  Sustainable Sanitation

15:00 - 16:30  4  Mr. Mihir Saoji  Mr. Bernd Peukert  Modular Equipment in Sustainable Manufacturing Environments
<table>
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<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
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<td>10:30 - 14:00</td>
<td>Sustainability in Fashion</td>
<td>Prof. Friederike von Wedel</td>
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<tr>
<td>10:30 - 16:30</td>
<td>Technology and Innovation Management</td>
<td>Ms. Huynh Dinh Thai Linh</td>
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<tr>
<td>13:00 - 14:30</td>
<td>Industrial Development and Urban Sustainability</td>
<td>Dr. Pham Thai Son</td>
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<tr>
<td>15:00 - 17:00</td>
<td>Sustainable Business Model Strategies</td>
<td>Dr. Ana Paula Barquet Mr. Johannes Seidel</td>
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<tr>
<td>17:00 - 18:30</td>
<td>Human Centred Automation</td>
<td>Mr. The Duy Nguyen</td>
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<tr>
<td>17:00 - 18:30</td>
<td>Higher Resource Productivity</td>
<td>Mr. Thomas Guidat</td>
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