Development Engineering

TD 463

Lecture 1

Milind Sohoni
Centre for Technology Alternatives for Rural Areas, CSE
IIT-Bombay

www.ctara.iitb.ac.in

www.cse.iitb.ac.in/∼sohoni

Objectives

The objective of the course is to prepare an engineering student for professional work in the development sectors, i.e., to work as a development engineer. This requires:

- basic understanding of society and development and the data-sets that surround it,
- the role of agents, professions and value-creation, and
- the ability to formulate problems, analyse them into its constituent disciplinary parts, solve and report them for stakeholders, and
- the ability to design, conduct and report field-work, and finally
- a particular discipline of engineering and how it contributes to development.

Organization of the course

Topics

- The method of science and of engineering.
- Development and its measurements.
- Structure of Society.
- Sector-Engineering systems in development.
- Field and analytic methods.

Evaluation

- 3 reviews/analysis (45%), project (45%) and class participation(10%).
- 5 days of field work.

The Development Questions

- Who and how will basic amenities be provided to our people?
- How will our small companies, our biggest empoyers, do better?
- Where will good jobs come from?

Methodology.

- What are basic amenities? How are they currently being delivered?
- Where do jobs come from? What is the role of the state, civil society and market?
- What are possible recipes for change? Are there gainful ways of bringing about change?

How we are

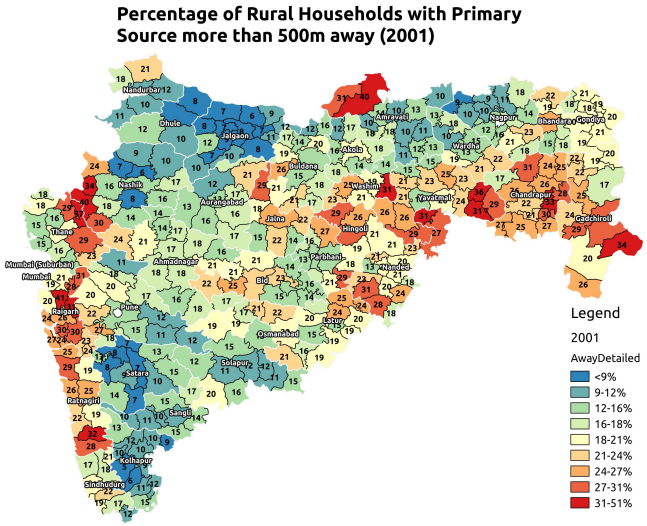
Manisha and her family

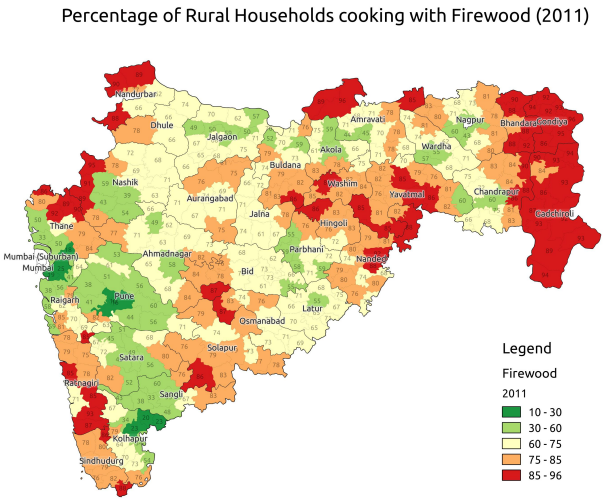
Hirabai at her cookstove

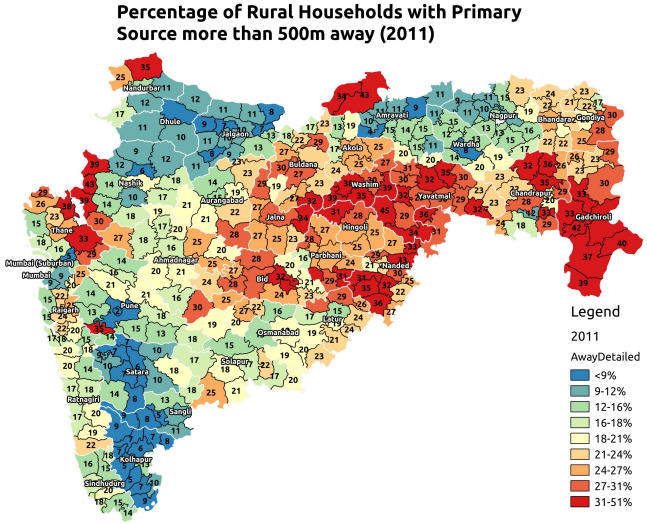
And here is the data (census)

A vast majority

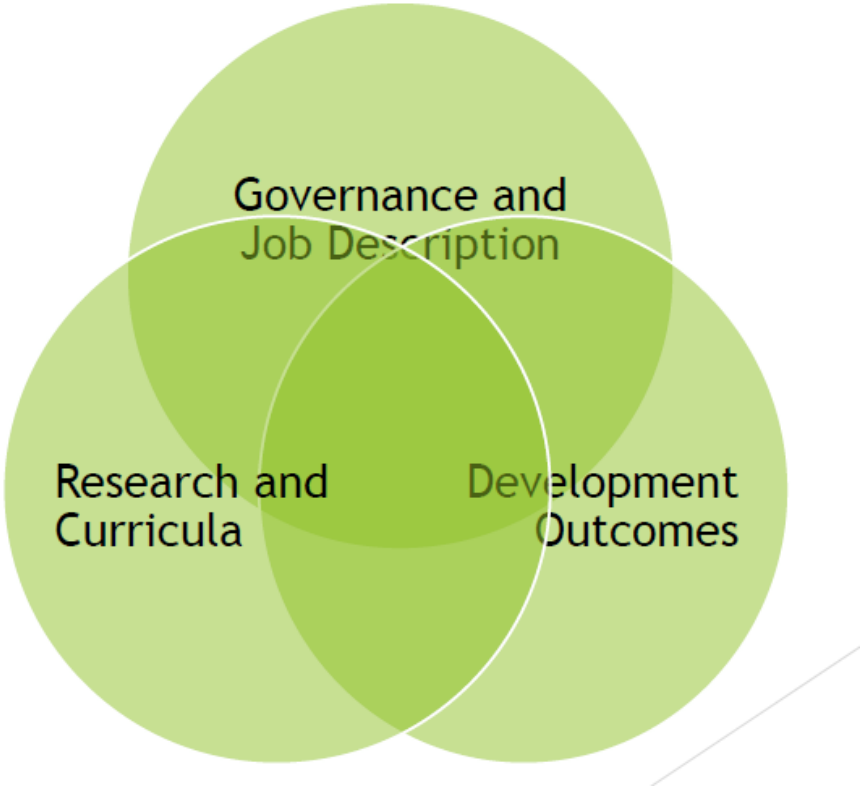
- A life of great drudgery and anxiety.
- *Perhaps a deterioration as environmental stress mounts.*







The alignment



- How are new professions to be created? What is the knowledge requirement for these new jobs?
- What is IITs role in this? See `RD.pdf`, `aicteCS.pdf`

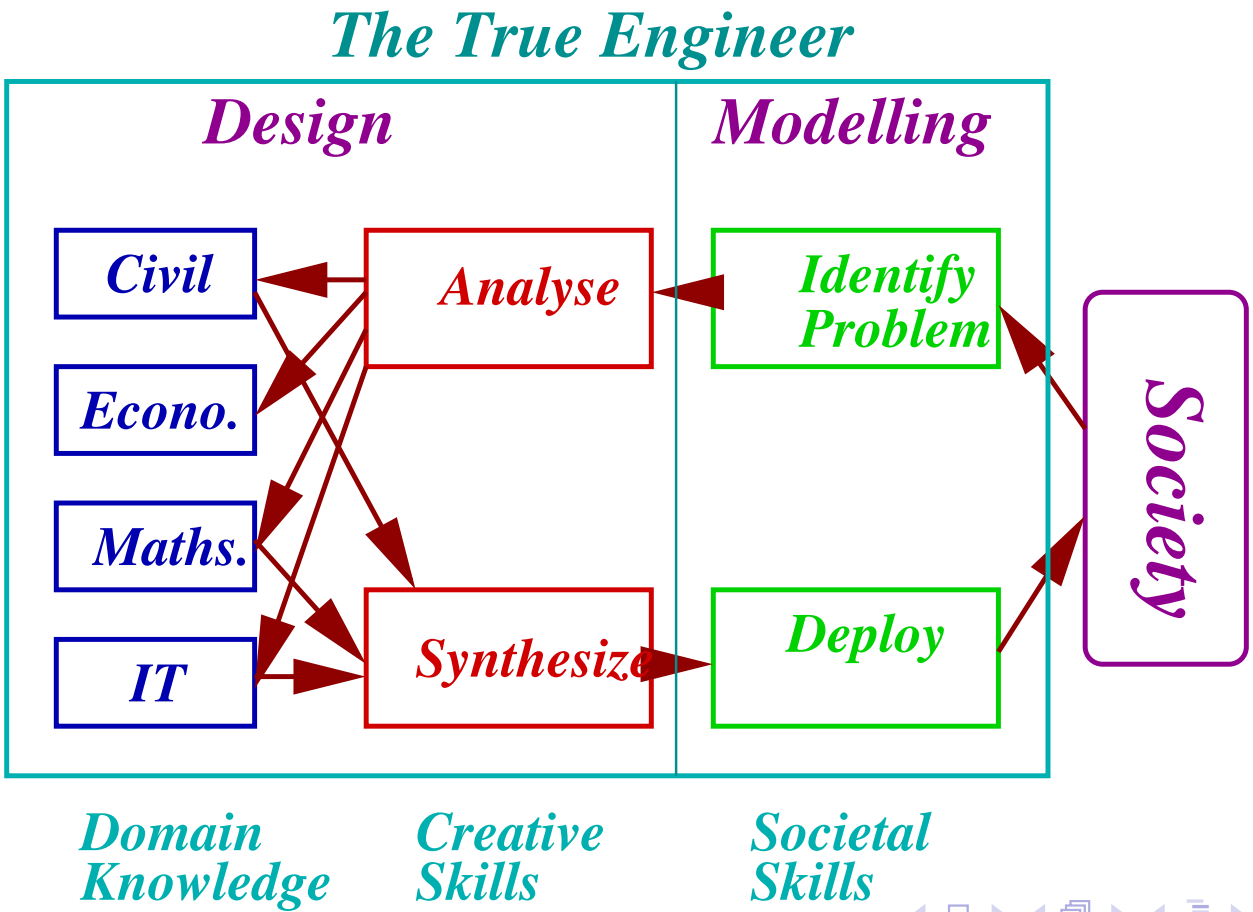
Development Engineering

Development Engineering may be defined as the

- inter-disciplinary study of
  - engineering and science of the provision of basic engineering services such as drinking water or electricity and resources such as firewood,
  - the issues and problems of household and small enterprises
  - principles of value-creation and social outcomes
- the methods of
  - applied social science, field-work, problem formulation, analysis, engagement and reporting
  - the use of a planning framework for the above, i.e., the supply, demand and allocation of resources and services, the underlying socio-economic, governance and technical issues
- the values
  - of equity, efficiency and sustainability
  - and recognition of the role of community and culture.

The New Engineer

- Identify a *societal problem* and a *stakeholder!*
- Analyse the problem and separate it elementary subproblems
- Solve, Synthesize and Deploy the complete solution.
- The true engineer is *inter-disciplinary*



The Regional Engineering Framework

Department	Last-mile areas
CSE	Public Transport, PDS logistics
Economics	District Economic Plan, GP development plan
Civil Engg.	Taluka DW plan, Low-cost housing
Elec. Engg.	Household efficiency, Agricultural Feeders
General Engg.	Urban Local Body, Bus Depots, Irrigation Systems
Planning	Electricity, Water, Sanitation, Energy

- Development Engg.: an inter-disciplinary course.
- More field-work, more space for electives. Project based learning.
- Interactions with regional agencies. Systematic interaction with people.
- **Case-studies**. **Planning**.

Composite Skills-Academic Framework

The Case-study

- Assessing PDS coverage in a Gram Panchayat. Evaluating *anganwadis*.
- Preparing the Bio-diversity register for a GP. Forest plans.
- Computing the agricultural GDP in a taluka. Recording farmer narratives.
- Preparing a village sanitation and waste disposal plan.
- Preparing ideal time-tables for city public transport system.
- Guiding municipal corporations in energy efficiency.
- Visiting a Poha Factory. Designing a *haldi* cooking machine.

Exciting -Comprehension and Delivery

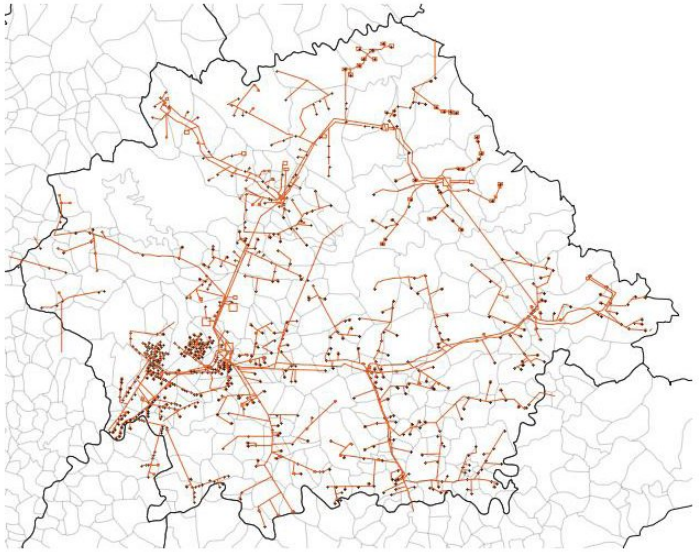
- All areas of knowledge.
- Soft-skills, data, maps and quantification, analysis, scientific temper, reporting, documentation.

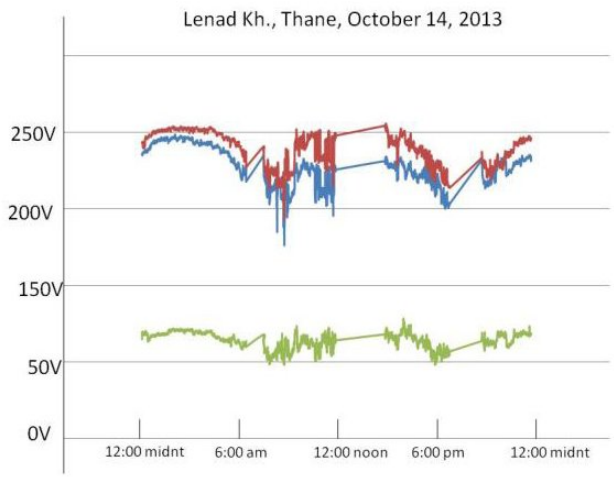
The concrete cycle-I

- Energy bill reduction through the use of solar dish.
- Conversion of *Istry* from electricity to steam.
- How to make leaf-plate making more efficient.
- Supply chains for bio-mass power plants.
- Temperature regulation in poultry farm.

The concrete cycle-I

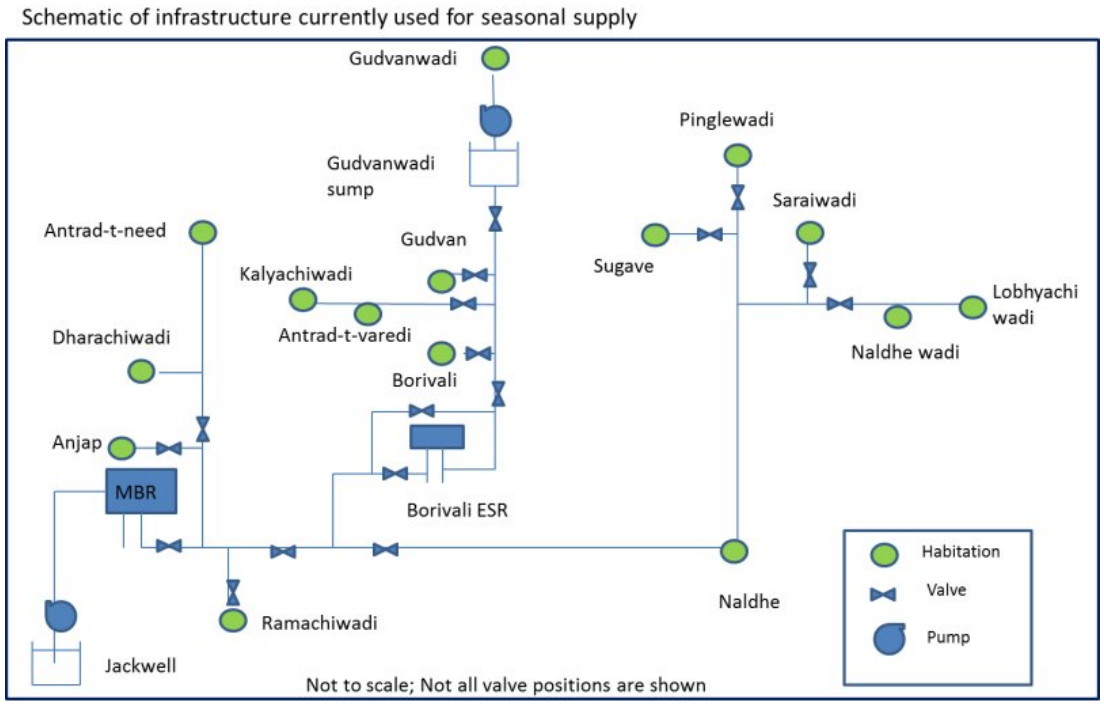
The concrete cycle-I





- Power quality meter-3-phase, voltage, power factor, harmonics
- Measurements at irrigation pumps
- Mapping of *taluka* grid.

Sample Projects

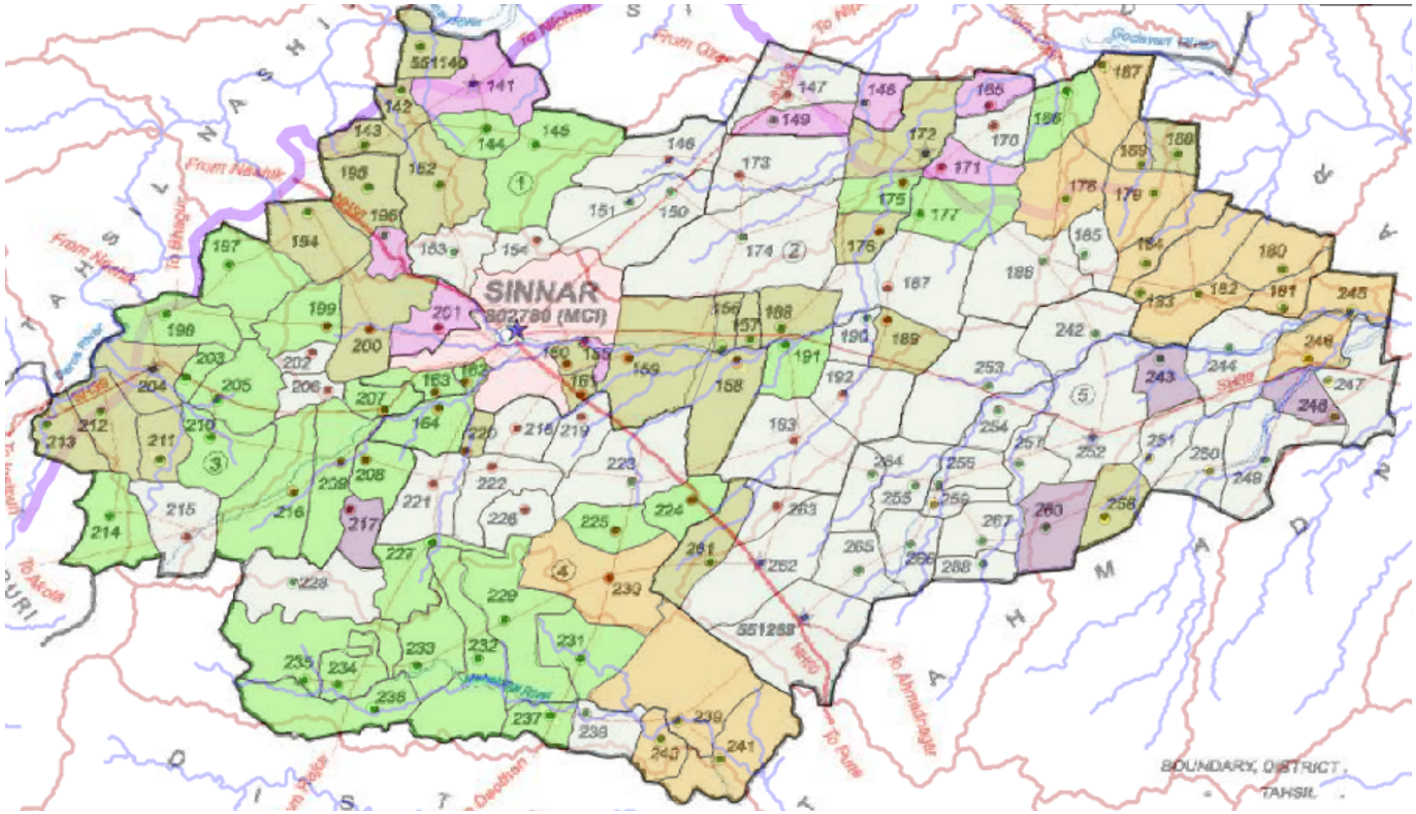


Analysis of a failed rural regional(RR) Water supply scheme. Designs for many other.

Sample Projects

Rooftop solar plan for a complete gram-panchayat (Kerala).

Sample Projects



Irrigation plans for your district or taluka.