

## MSc Research Skills

### Lecture: More on formulating research problems

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#### Topic: Thinking about research

Recall:

“**research**” from the French *rechercher*, “to look for”, by extension “to investigate”, “to [attempt to] find out”.

To do research is to **discover** something that was previously completely or partially **unknown** or **not understood**.

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#### What is something new?

Recall: The “something new” to be discovered may be:

- new **facts** about the **natural** world, the **built** (engineered) world, or human **society**;
- new understanding of the **processes** in these;
- new or improved **methods** to investigate the above;
- new or improved **systems**;
- new or improved **models**; or
- a new **synthesis** (conceptual framework) of existing facts.

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#### Structure of a research proposal

Recall:

A research proposal usually has a logical structure something like:

**Problem** ⇒ **Objectives** ⇒ **Questions** ⇒ **Hypotheses** ⇒ **Methods**

Here we concentrate on finding the **research problem**.

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## Key link

1. Something is **not known**;
2. It can be (partially) known **by research**.

**Both** of these must be identified in the research proposal.

### Identifying these two

- in **enough detail and specificity**
- to formulate an **operationally-sound research plan**

is the great difficulty for many MSc students.

## UT/ITC context

- **applied** research (UT is a technical university);
- **geoinformation** must (?) be central to the research
  - \* the problem must somehow require geoinformation to solve it; or
  - \* the research is about the effective use of geoinformation to solve the problem (**methodological** research)
- Faculty ITC has an explicit **development** mission, so the benefits of solving the research problem must (?) somehow to relate to development

**Note:** not all ITC staff agree with this, but it is our only *raison d'être*.

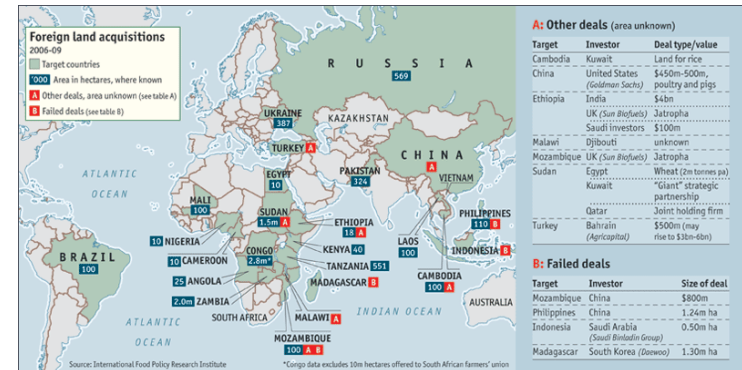
## Problems in a social context

Recall:

1. Why should anyone **care about the outcome** of this research?
2. Who would use the **results** of this research? and **for what?**
3. Why should anyone **sponsor** this research?

## Starting point – a trend with unknown consequences

“Outsourcing’s third wave: Rich food importers are acquiring vast tracts of poor countries’ farmland. Is this beneficial foreign investment or neocolonialism?”  
– The Economist, 21-May-2009<sup>1</sup>



<sup>1</sup> <http://www.economist.com/node/13692889>

### Problem analysis

- Millenium Development Goal: reduce **hunger** & **malnutrition**
- These are caused by insufficient **supply** but more (at a global scale) by insufficient **purchasing power**
  - \* restrict the discussion to **urban** hunger & malnutrition
- So the problem is either **too low incomes** or **too high food prices**
- We concentrate on prices: these are **increasing** relative to incomes because of **export** to richer economies
- Some of the export is from local producers but a new source is the **foreign-owned farms**.

**Note:** all of these statements to be expanded and supported by **literature**; and organized in a **conceptual framework**.

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### Narrowing down the problem - 1

1. What is already known? → **Literature review!!**
2. What then is not known / uncertain? → **opportunity**
  - Which of these involve **geoinformation**?
  - Already the **development** relevance is clear!

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### Narrowing down the problem - 2

3. Select a "small" **study area**:
  - **Time is short** in the MSc thesis period, no chance for delays
  - Easy (?) access to information, reliable **contacts**
  - Good **logistics** / local support
  - Specific information on the problem in a local context → **Literature review!!**
  - "Small" depends on geographic scope of research question
    - \* Village: effect on a local economy / environment
    - \* County, city: food prices and local market; transport
    - \* Country: national policy; transport

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### Where is the research problem?

Note we are *not* trying to solve the social / political / economic problem, that is for the politicians / policy makers.

We are trying to provide:

- **information** about the true state of affairs, or
- **knowledge** about the causes of these

This may require an improvement in **methods**.

We now look at some sets of **research problems** which could be the focus of research, in this context.

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### Problem set 1: information

- What is the trend? → **time-series of imagery**?
- Where is it concentrated? → **spatial analysis**
- Is this new cropland or is it displacing existing farms?
- What happens to local populations? (employed? displaced?)
- What happens to food supply? (exported? sold locally?)

All of these: **quantify** with **uncertainty**; replace anecdote with “fact”.

### Problem set 2: knowledge

- What are the **drivers** or **enablers** of this process?
- Which of these are **local**, what proportion of these are under local / national control?

### Problem set 3: methods

For all the above, are the current **methods** for studying them sufficient? Two examples:

- Time-series of satellite imagery
  - \* The usual problems of making time-series compatible
  - \* Cloud removal / extrapolation
  - \* Identifying commercial farms vs. local farms
  - \* Identifying foreign-owned farms (!!??) size? shape? date established?
- Crop statistics
  - \* How can their reliability / currency / spatial resolution be improved?

### Summary

These are just some useful (?) thoughts on how to think about research and research problems; please see the textbook for other worked examples.

And ... **try to work this out for your research!**