The Challenges of Trans-disciplinary Research at ASU

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Sander van der Leeuw

School of Human Evolution and Social Change

Arizona State University

TDR often starts with the wrong expectations

◊ Trans–disciplinary research implies severing the link between data and meaning built up in each discipline;

◊ It implies taking data and/or theories out of their original contexts

◊ Integration is therefore almost always at the level of the lowest common denominator, leading to reductionism

Let's look at the reasons for this in some detail

How do Disciplines Originate ?

◊ How does understanding emerge?

- Searching for regularities (defining problems)
- Finding the pattern (the solution)

◊ Convergence of elements of understanding

- Unifying perspectives on them
- Constructing meta-language that links them
- Discarding apparent noise

Disciplines are a Question of … Discipline

◊ Discipline

   - is at the root of the strengths of the disciplines …

   - limits research to questions within the range accepted by the scholars involved

◊ Disciplines have developed different perspectives (on space, time and other things)

➢ *We get a <u>bee's eye view</u> in which the brain makes the final link (jump) between the different images.*

➢ *What can one do to make the various images as compatible, and yet as complementary as possible?*

Disciplinary Competition and Conflict

◊ Cultural differences (e.g. the respective roles of theory and observation)

◊ Different levels of generality (theoretical, practical and applied research, engineering)

◊ Different methodologies (role of induction, deduction, models)

◊ Different degrees of precision (conceptual fuzziness)

◊ Different degrees of investment (many researchers on small topics, few researchers on huge ones)

◊ Differences in data

MACH vs BOHR

◊ <u>Ernst Mach</u> : Theories in physics are generalised prescriptions, deriving value from traditional practices.

◊ <u>Niels Bohr</u> : Physicists need to believe in an objective world - depriving them of it is the end of physics' power.

◊ Extreme positivism *(Ranke: 'Die Interpretation schwankt, die Tatsachen bleiben')* hampers trans–disciplinary work

◊ *There is no objectivity – there is no single truth*

◊ *There are only epistemological relationships between observations and ideas*

What Determines Our Ideas?

◊ Perception mediates between us and our environment

- One cannot objectify it, or separate data from meaning. All information is contextual.

- We have to assume :

  ➢ the relative under–determination of our theories by our observations

  ➢ their relative over–determination by socio-culturally negotiated perspectives that cannot be challenged

◊ Data are poly–interpretable

◊ Data are transformed into information by relating them to existing meanings (concepts, questions and values)

The Epistemological Process

◊ Relates data to existing culture (in the widest sense)

◊ Is thus individual, disciplinary, cultural etc.

◊ People partake in it as passive, active and reflexive individuals

  • they look at, they interpret and they observe their own perceptions and actions

◊ Different disciplines and communities negotiate different "environments" or "ecologies"

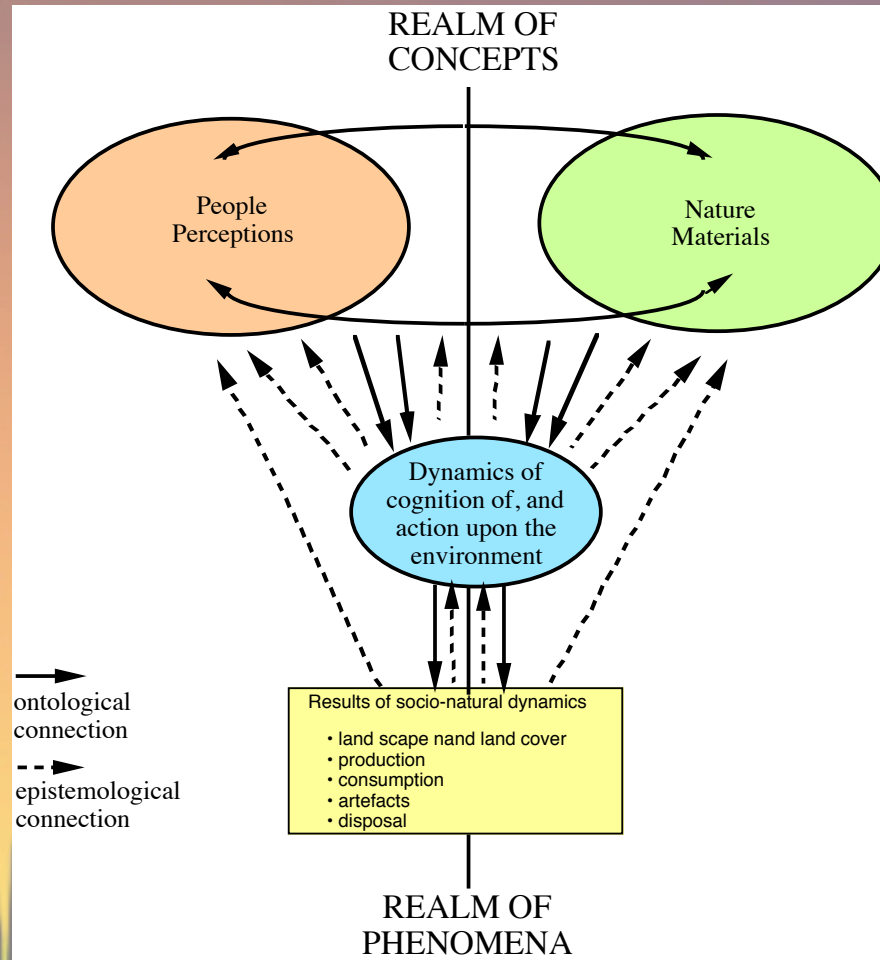◊ It is the purpose of our work, and of this discussion, to bring them closer together

Creation of Domains of Knowledge
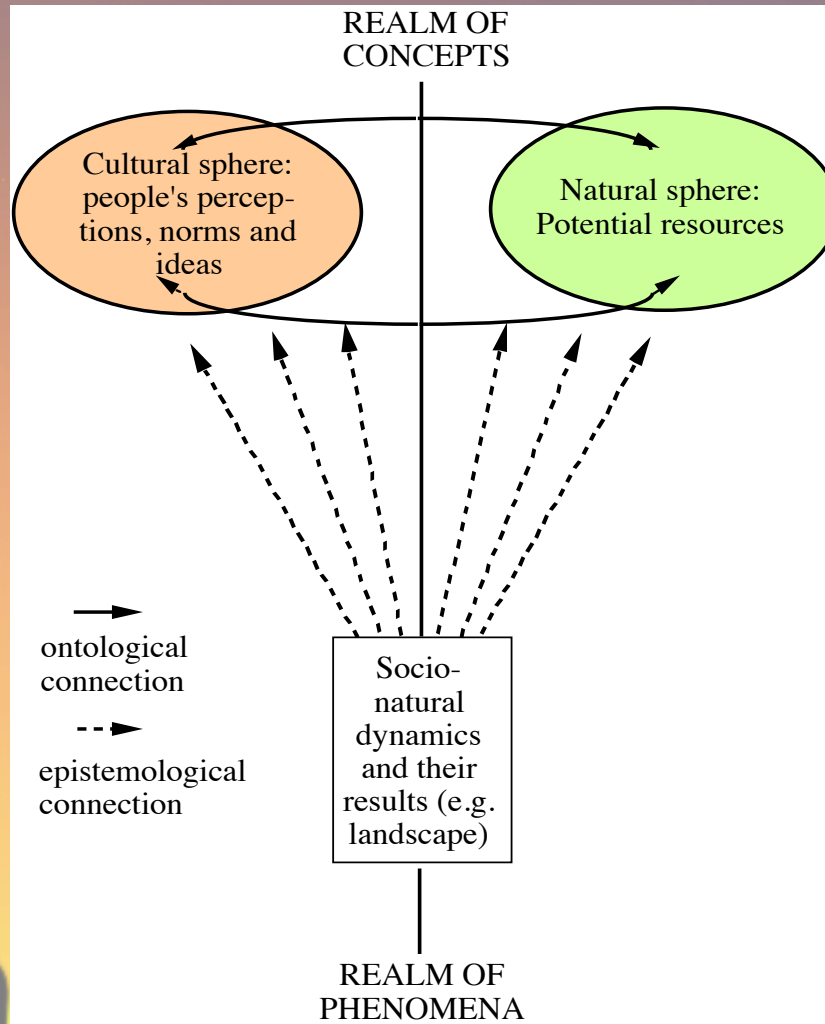
Transformation into Disciplines
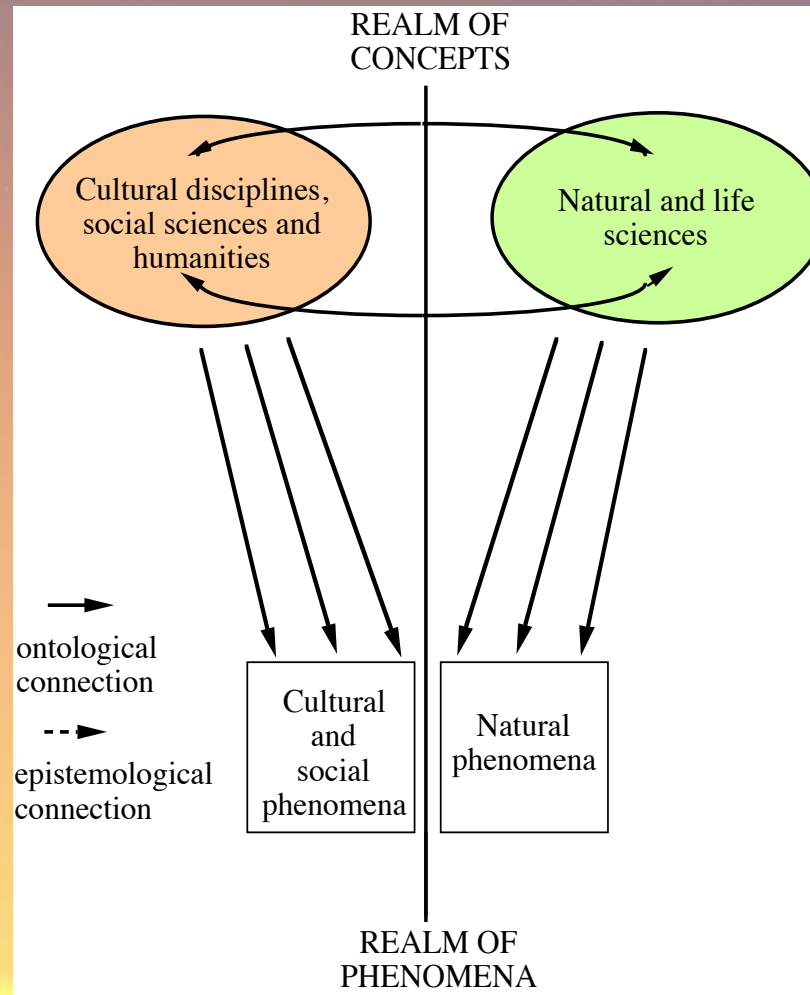
Introduction of a Model

Negotation Between Disciplines

◊ There is negotiation around a set of non-negotiable observations.

◊ Those observations were made in response to negotiated questions.

◊ Scientific trans–disciplinarity is inter-subjectively assessing the objective results of research aimed at solving subjective questions

The Aim of Trans-disciplinary Projects

◊ The principal aim of any trans–disciplinary project is:

- to negotiate the essential questions to be asked
- to negotiate how they can be answered from many different cultural and disciplinary backgrounds.

◊ Its is NOT to negotiate the concepts to be used in answering those questions

- that leads to disciplinary battles and suppresses the fuzziness of concepts that is essential for creativity

The Requirements of a Trans-Disciplinary Project

◊ All disciplines must acknowledge:
- entities exist in many different, but equivalent, ways
- these are linked to certain practices, and requirements
- differences between perspectives or negotiated practices (understanding), rather than kinds of phenomena (knowledge).

➢ *Concepts and questions need to be defined together*

➢ *Socio-natural research is neither social science nor natural science, but delivers constructs all its own.*

◊ Comparative judgments should be like "*this kind of under-standing is (not) applicable to this range of perspectives*"

Example: The Socio-Natural Approach

◊ There is no natural system, there is no social system, there are only socio-natural interactions

- Environmental issues are socio–natural issues
- Perception and technique interface between people and environments
- Crises are temporary incapacities of the people to process enough information to deal with complex dynamics
- Patterns are due to interactions of entities at lower levels
- Spatio-temporal correlations rather than causalities

What is the Nature of Socio-Natural Interactions ?

◊ We hardly know, because we have generally focussed on either social or natural dynamics.

◊ How should we imagine them?

◊ Perception and technique are the two crucial areas

- Environmental communication is <u>about</u> the environment, <u>not with</u> it.

- Environmental problems do exist by virtue of the fact that they have been defined in and by a society: they are culture-bound

Practice

◊ Open up the "kitchen" of the individual disciplines (and practitioners) to outside looks

◊ Change attitude to one that is interested in how others think, rather than promulgating one's own (discipline's) ideas as "truth" or belittling others' ideas

◊ Find a fulcrum between a post–modern and a socio–biological perspective

◊ Take an anthropological perspective

➢ *The difficulty is in <u>not</u> going for the simple solution*

What Can One Do?

◊ Personality must transcend learning
◊ Create a basis of trust
◊ Create a neutral context
◊ Create long-term, personal interaction in the team
  - Eat, drink and be merry together ….
  - Organise self-structuring meetings
  - Focus on small groups (Rule of six information sources)
  - Team up people of different disciplines for longer periods
  - Definitions discussions are a stage on to play power games on
  - Data are ways to put people from other disciplines down
  - Discuss themes across topics & fields

Local and Formal Knowledge

◊ These two kinds of knowledge find their source and their legitimation in different areas

◊ *Experience* vs. *Education*

- 'I am legitimate because I live here' vs. 'I am legitimate because I have studied'.

- Bottom-up vs. top-down knowledge.

- Detailed circumstantial knowledge vs. generalised abstract knowledge.

- Importance of 'bottom up' component in project and system design

Transdisciplinarity between Research and Policy

◊ Research is question-driven, open-ended but policy is solution-driven, closed.

◊ Interaction between research and policy should take place at all the levels concerned,

- It should include both knowledge formulation and -use, and policy formulation and -implementation,

- It should identify the different agendas involved,

- It should formulate the relevant questions, research aims, policies and policy implementation measures at each level.

The Role of Modelling

◊ Modelling is a tool to force conscious integration of ideas from different disciplines

◊ Making models of reality or testing theories against data?

◊ Mediation by specialists in inter–disciplinarity

◊ The difficulty of assuming responsibility: modellers and sociologists/agronomers

From 'Anthropology' to 'Human Evolution and Social Change' at ASU

◊ The Anthropology Department has morphed into the School of Human Evolution and Social Change
- Part of the horizontally networked university
- A focus on issues of the XXIst century
- A trans-disciplinary approach and organization
- A changing approach to teaching
- A new role for anthropology at the core of a range of disciplines

◊ http://shesc.esu.edu

Reasons for this transformation

◊ Anthropology has not kept pace with developments in the post-colonial period

- It was torn apart between the developed and the (fragmenting) developing world
  - ◊ It has lost its focus on mediating between cultures

- It went through a crisis of conscience
  - ◊ It has lost its impact on academic and political events

- It needs to refocus on our own multi-cultural societies

◊ *To regain momentum it must re-energize and refocus the discipline on today's issues:*

- Sustainability, equity, development, etc.

Some recent changes

◇ Faculty growth from 35 to 55 + 3 Research Faculty, 4 Emeriti, lots of affiliates etc.

- 4 mathematicians, 3 sociologists, 2 economists, 2 political scientists, 1 geographer, 1 geneticist, 2 STS, 5 anthropologists, 2 medical anthropologists

◇ New collaborative degrees:

- Revamped BA in Anthropology (in progress) BA in Global Health, BS in Applied Mathematics for the Life and Social sciences, BS in anthropology (in progress)

- MA in Global Health, Museum Studies

- PhD's in Environmental Social Science, Social Sciences of Health, Human and Social Dimensions of Science and Technology, Applied Mathematics for the Life and Social Sciences

◇ Other developments in the planning stage

Focus on the challenges of the 21st century

◊ Research and training themes
  - Human Origins, Evolution and Diversity
  - Societies and their Environments
  - Urban Societies
  - Biological, social and cultural dimensions of human health
  - Identity and Culture
  - Globalization and regional interaction
  - Technology and society
◊ In each case, we take the very long perspective

Reasons for very long-term research

◊ The world is dependent on scenario's to plan a very complex future
  - These are based on the last 50-200 years
  - That is a very high risk strategy
◊ If you don't take the longer term into account:
  - you miss the long time-scales (millennia)
  - you overlook many instances of the dynamic
  - your sample is biased towards the present
  - you overlook the change of change (e.g. change in time horizon)
  - you overlook the role of legacies
◊ Studying multi-scalar spatio-temporal phenomena involves the disciplines most appropriate for each

Some examples

◇ SHESC has large portfolio of projects and ideas
◇ Due to new direction not always suitable for 'classic' channels (federal funding)
- Some too 'applied'
- Some too risky or too early
◇ Presenting a handful as examples
- Give a flavor of the kinds of things we are doing
- Not only in your collective foci, because I'd also like advice as to where else to go
◇ My first foray into 'foundation-land'
- Please give me any comment you may have

Human Origins, Evolution and Diversity

◊ Cooperation, Culture and the Spread of Modern *Homo Sapiens*

- Is human uniqueness a product of 'eusocial' cooperation and transmission of cultural conventions promoting "other-regarding behaviors" between non-kin?

- Does its emergence coincide with the origins of morality and ethnicity, and their unique emotional underpinnings?

- This implies *natural* selection of genes and *cultural patterns* from the individual to large cooperative-breeding extended-kin-units, and to higher level coalitions.

- Together, this would have given an important advantage to humans over other species (e.g. chimpanzees) in life expectancy

◊ Project combines experimental economics, game theory, common pool resource theory etc. with anthropology and archaeology

Human Origins, Evolution and Diversity

◊ Hadar (Afar, Ethiopia)
  - Long term research on human origins by our paleo-anthropologists
  - Lucy, but many other finds as well.
  - Fundamental area for understanding of human origins
  - World Heritage site
  - With Ethiopian government (ARCCH) and NGS, we are now trying to protect the area
  - To do so, we must communicate its importance to the local population
  - We are therefore building a (small) museum

Societies and their Environments

◊ Long Term Vulnerability and Resilience in the US Southwest

- Detailed social-environmental data (AD 400 to 1600):
- Diverse trajectories of in similar arid environment
  ◊ Hohokam: huge scale irrigation
  ◊ Mesa Verde: rainfall agriculture
  ◊ In both large institutions rise and fall dramatically
  ◊ Zuni and Salinas: long stable sequences, less investment
  ◊ La Quemada: urbanization
- 'Classic' study of long term resilience
- Major modeling input, now put on the web (IHOPE)
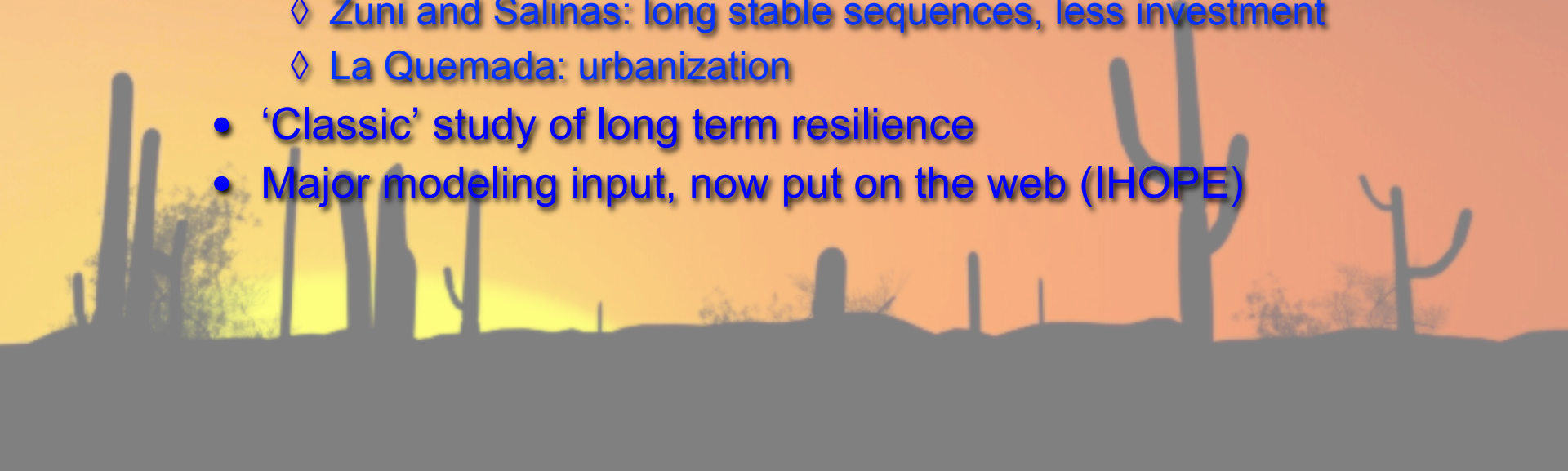
Societies and their Environments

◇ Long-term evolution of Mediterranean landscapes
- Combine archaeological and written data with modern scientific insights to model multi-temporal dynamics of land use
- Use this to make more informed decisions today.
- Three areas: SE Spain, Rhone Valley, W. Jordan

◇ Three foci:
- the effects of growth in agro-pastoral systems on biodiversity;
- the impacts of land use intensification on landscape resilience and vulnerability to degradation;
- the long-term sustainability of human maintained socio-ecosystems in varying environmental and social contexts.

◇ What is different or similar between these regions?
- Are differences the result of natural or cultural factors?
- How do we identify long-term sustainable uses of the land?
- How to put these in place?

Societies and their Environments

◇ Societies in transition in the Philippines
- Migration and Household Economic Diversification in the Palawan Fishing Economy
  - ◇ Migration and changes in the exploitation of coastal zone resources are transforming household economic strategies
  - ◇ How do these affect natural resource management?
- Re-envisioning the Upland Philippines
  - ◇ New patterns of upland land use, geographic mobility, new axes of social differentiation and cultural allegiance today bind uplands to lowlands
  - ◇ How best to characterize these transformations?
  - ◇ Which new conflicts emerge?
  - ◇ How will these changes affect the future?
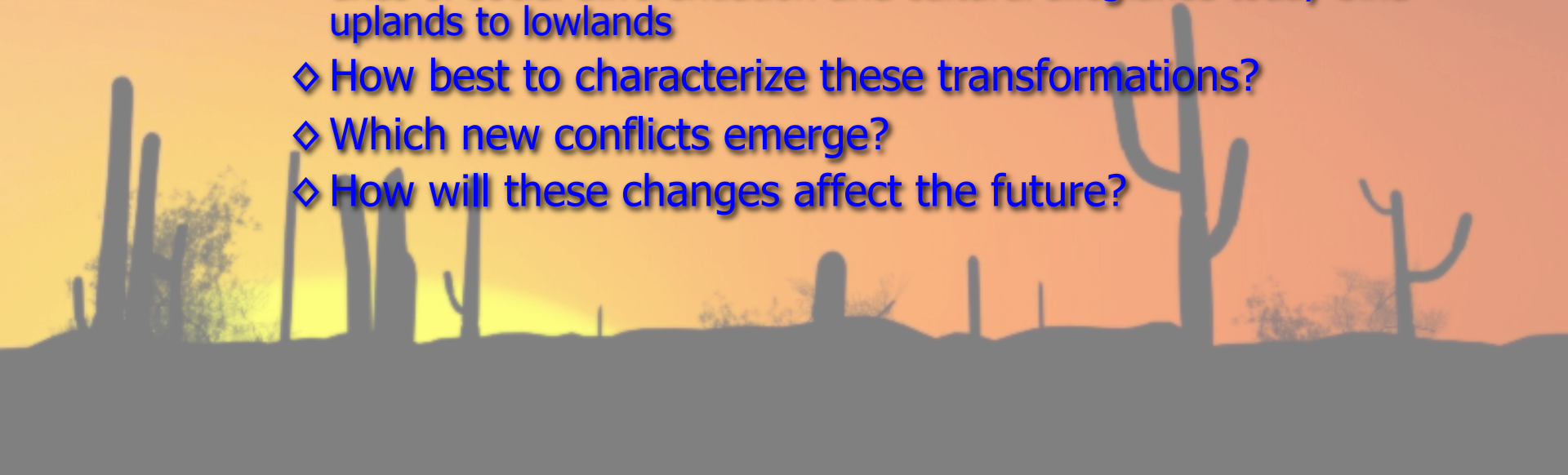
Social-cultural dimensions of Health

◊ South Phoenix project
  - Use social science to help agencies further social change
    ◊ history (how did health inequities focus geographically),
    ◊ cultural processes (how do people relate to each other),
    ◊ cultural knowledge (what local knowledge works well)
  - What is new?
    ◊ Study cultural variation at root of health and environment issues
    ◊ Use case study to intersect methods at multiple scales
    ◊ Analysis of space, modeling, scenario creation
    ◊ Stakeholder involvement
  - Example:
    ◊) Study health issues (obesity, family planning, STD) by linking individual knowledge to social networks and geography
    ◊ 'What if?' scenarios (e.g. hardening of attitude to Latino's
  - Focus: general methodology to identify role of information, which can be exported elsewhere

Social-cultural dimensions of Health

◊ Indigenous Health Sciences and Human Rights Group
- Indigenous minorities' health suffers excessively as there is no healthcare/protection
- Aims to generate strategic solutions to protect complex socio-cultural and environmental systems upon which populations, and the surrounding biodiversity depends
  - ◊ International clearinghouse of date and publications
  - ◊ Disease surveillance system
  - ◊ Use of models to predict resurgence
  - ◊ Design, implementation and evaluation of community-based programs linking indigenous communities to the initiatives
  - ◊ Study of the implications of these scientific activities for understanding the origins of human resilience through hyper-cooperation

Technology and Society

◊ Phoenix Innovation Study: improving the resilience of a city
  - Aim:
    - ◊ To compare Phoenix with other metropolitan areas
    - ◊ To understand the factors limiting invention and innovation
    - ◊ To remove obstacles and make the climate more conducive
  - New:
    - ◊ A generative approach to studying innovation
    - ◊ Combining economics with social science techniques (ethnographic observation, in-depth interviews, spatial econometrics)
    - ◊ 3 levels:
      - Micro-businesses
      - SME's
      - Large companies
    - ◊ Emphasis on role of ethnic minorities

Late Lessons from Early History

◇ Linking the whole past to the future and fostering intellectual fusion in the School

- Paleo–anthropology and Paleo–genetics of Fynbos, Marine Ecosystems and Human Origins
- People, Primates, and Pathogens: The Evolution of a Global Emergency and the Future of Conservation and Public Health Efforts
- Change is hard: the challenges of path-dependence
- Urban Organization Through The Ages: Neighborhoods, Open Spaces, and Urban Life
- Cooperation, social networks, and global health

Conclusion

◇ What do we have?

- An interested and interesting scientific community that intends to make a difference
- A supportive administration that wants to foster this approach throughout the university

◇ What am I looking for?

- A dialogue on challenges, ideas, advice, implementation, support