PIIRS Project on Historical Globalization

Project Description

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In that Empire, the craft of Cartography attained such Perfection that the map of a Single Province covered the space of an entire City, and the Map of the Empire itself an entire Province. In the course of Time, these Extensive maps were found somehow wanting, and so the College of Cartographers evolved a Map of the Empire that was of the same Scale as the Empire and that coincided with it point for point.

—Jorge Luis Borges

In historical analysis . . . the long run always wins in the end.

—Fernand Braudel

Introduction

Globalization is everywhere. States, economies, and societies are increasingly integrated; flows of goods, capital, humans, and cultural objects now link us in a global web. There is little doubt that we are undergoing a process of compression of international time and space. Globalization is also nowhere. Lacking a coherent empirical or theoretical underpinning, the concept is in danger of becoming an academic "one-hit-wonder" with little to show for the attention[1]. What does globalization mean? Does it represent a revolutionary change in human history? What can we learn from similar historical phenomena and epochs?

To address those questions, the Princeton Institute for International and Regional Studies (PIIRS) of Princeton University proposes a new way to study globalization and to place it in its appropriate context. The two quotes above suggest the dilemma facing analysts of contemporary global relations. While Braudel advises attention to the *longue durée* and the need to place modern developments in the appropriate historical context, Borges cautions against providing so much background, so much detail, as to create an undiluted portrait of precisely what we are trying to understand. The proposed project will allow for both analytical comprehension without oversimplification and comprehensive accounting without excessive specificity. We propose to foster a better understanding of contemporary reality and the historical process that accounts for it through a collaborative project that will: include cartographic and data-graphic representations of historical transregional flows, produce a succinct analysis of the development of these links over the past five thousand years**.** and promote further systemic study of historical globalization.

[1] For some representative pieces see Mittelman 2000, Hirst and Thompson 1996, Sassen 1991, Castells 1996, and Guillén 2000, Garrett 2000 . The closest we have come to a systemic understanding of globalization is through the World System tradition (Wallerstein 1979, Chase-Dunn and hall 1997, Chase-Dunn and Grimes 1995).

Specifically, PIIRS seeks support for its Project on Historical Globalization (hereafter "the project"), which, as a whole, aims to support collaboration among researchers studying globalization through increasing the availability of data that will facilitate greater interdisciplinary communication. We propose to achieve those ends through two distinct scholarly programs:

1) The International Networks Archive (INA, hereafter "the archive"), a website (www.princeton.edu/~ina) that provides sophisticated interactive capabilities and complete access to the data collected by project researchers. The archive will serve largely as a resource for scholars and advanced students. It will function as a central location for data sets relevant to empirical research on mapping the global web. Through the archive, the data sets can be assembled and standardized so that the various indicators can be combined. The archive, established in 1999, has already collected information covering the past three decades on exchanges by countries, organizations, and individuals throughout the globe. We seek to expand these data sets chronologically and offer mapping and other analytical tools for end users. A central innovation of the project is the simultaneous availability of data and representations thereof, as well as mechanisms that allow for the use of network analysis and mapping techniques on a custom basis.

2) *The Historical Atlas of Globalization* (hereafter "the atlas"), a stand-alone product providing a thorough and graphically exciting overview of the materials gathered. The book that will feature roughly 200 four-color maps generated through INA data. Each two-page plate will include: (a) a global map giving a context to the specific transaction being described, (b) a more detailed map focusing on the most important areas and connections, and (c) a graphic spotlight on a significant aspect of this transaction (e.g., volume over time). Following a group of maps defined by region or form of transaction, a short essay and suggested bibliography will provide readers with scholarly context. The atlas will serve as a pedagogical tool to introduce and disseminate information to the widest possible audience, an audience that is still extremely book-oriented.

The project combines two critical strategies. First, no single scholar or institution can achieve a truly accurate portrayal of contemporary global transactions due to their complexities. To address the intricacies of both the transactions and their analysis, we propose to assemble a project team comprising an international and multidisciplinary cohort of scholars that is committed to and capable of producing the requisite scholarly mosaic.[2] Second, we recognize that the term "globalization" is fraught with political meaning. Some link it to an imperial neoliberal project; others see it as an inherently critical perspective on a natural evolution. To aid both public and scholarly discussions of the phenomenon, we seek to create an empirical product that will provide solid information and historical and geographical context.

We propose a paradigmatic shift in how both globalization is analyzed and how it fits into a more general history. More specifically, this long-term project will make contributions at the following levels:

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[2] The closest model for the aspirations of INA is the human genome project and its successful efforts to unite a scientific community behind an empirical target. For the PIIRS project, relevant models are the Interactive Mediterranean Project at UNC (http://iam.classics.unc.edu) and the resulting *Barrington Atlas of the Greek and Roman World*.

1. It will collect data from scholars and provide critical support for broad-based investigations into one of the most important social phenomena of the twenty-first century, globalization.
2. It will create Web-based, data-archiving systems that will enable worldwide access to databases on which the atlas will be based.
3. It will facilitate intensive cross-fertilization of research ideas and projects among selected researchers of diverse backgrounds, disciplines, and interests.
4. It will publish a printed atlas that will provide a coherent and concise summary of changes in global connections across the past ten millennia and allow for a better analysis of what can often be a confused and disordered jumble of transactions.

Why such a project? The new communication technologies provide opportunities that were largely unimagined by earlier cartographies. The Internet frees us from the constraints placed on both libraries and paper publications. The audience for our archive is global. Moreover, by not being limited to a single publication date or even a single product, we will be able to update our data perpetually. With information management techniques, we will also create searchable databases that will allow scholars to create their individualized research projects. Linking these searches to Geographic Information Systems (GIS) technology will permit users to design and draw their own maps. Examples of those maps will be available to future users permitting progressive accumulation of knowledge and analysis. While other sites are available for simple data retrieval on global issues, ours is different in that it focuses on the phenomenon of globalization, provides data on transactions between countries, and allows for graphic manipulation of the data.

But the promise of the project is much more than a technological innovation. How does our printed atlas differ from excellent efforts such as *The Times Atlas of World History* (1993) and Oxford University Press's *Atlas of World History* (1999)? Our atlas will be the first to focus on globalization as an important way of looking at world history. With the volume, we hope to make clearer the substantive improvements our archive will make to a greater understanding of the past. Despite the new attention to world history over the past two decades, approaches to global geographic remain mired in sometimes outdated misconceptions. Ever since McNeill's *Rise of the West*, historians have come to appreciate more and more the critical role played by connections, diffusions, and interactions between different parts of the world. It is no longer enough to tell the story of everything (or alternatively, to define a teleological structure). Rather, world history has more recently attempted to define the "global web" of various periods, to place locales within this web, and to determine how this position and its accompanying interactions produced the next historical stages.[3] By focusing on the interaction between locales, societies, and nations we can provide a better understanding of how global integration has developed over the past five millennia.

This proposal outlines the importance of this area of research in the social sciences, the educational benefits of the project, the specifics concerning the administration of the archive, and a list of existing projects already affiliated with the project.

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[3] For discussions see Bentley 1996, 1997; Manning 1996; Geyer and Bright 1995; and Hodgson 1993. Some recent example of this type of work include Crosby 1986; Wolf 1982; McNeill and McNeill 2003; Bentley 1993; Curtin 2000, 1984; Pomerantz and Topik 1999; and Tignor et al. 2001. For excellent examples of a historical approach to globalization, see O'Rourke and Williamson 2001 and Bordo, Taylor and Williamson, 2003. For a critical perspective on globalization from a historian see Cooper 2001.

Scholarly and Educational Motivation

A major obstacle to our understanding of globalization has been that theoretical treatments have raced far past empirical evidence. Key distinctions between globalization and internationalization, for example, lack a concrete basis. Despite the ubiquity of the term globalization, we have remarkably little data on increasing international integration. Specifically, we lack a systemic capacity to compare the current process of globalization with previous periods of greater or lesser integration. Moreover, we lack the capacity to determine how the structure of participation in this global net affects and helps determine political, economic, or cultural outcomes.

The limited empirical work that has been done to date shares a series of common faults.[4] First, few projects have actually studied globalization as a phenomenon in itself. Second, analyses of international integration have often been limited to the OECD or to large regional groups. The specific relationships between countries *across the globe* remain under-studied. Similarly, attention has focused on contemporary developments with limited efforts to compare them with previous stages of international integration. Thus, the study of globalization has attempted to explore this phenomenon outside of its geographical and historical context. Third, most research has focused on a single form of integration. Yet globalization, if it is a significant social phenomenon in its own right, involves much more than the intensification of a single form of exchange. It is the possibility of *interaction* between a variety of interchanges across the globe, the complexity of these interactions, and the density of the ties between previously distant societies that may be truly significant.

To appreciate the particular qualities of globalization, the metaphor of a network may be appropriate. Most literally, networks are arrangements of connections into nets, or openwork systems linking groups of points and intersecting lines. Obvious examples are the body's circulatory network of veins or a country's arteries of rivers, canals, railways, and roads. Networks may also be interconnected chains or systems of immaterial things, events, or processes. A focus on networks allows us to examine the integration of economic, social, political, and cultural regimes as a process in and of itself. Viewing globalization as a network allows us to combine different forms of interaction (e.g., trade, migration, conflict) into a cohesive portrait of international integration. Finally, network methods operate under the assumption that structural position and associated characteristics are determinant, allowing for a clearer analysis of the consequences of globalization for individual societies over and above endogenous factors.

Yet, network analysts confront some difficulties in communicating their approaches and findings.[5] Operating in a multidimensional causal universe, network models often are reduced to abstract measures of centrality or require an intensive familiarity with sophisticated methods.

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[4] See Clark 1998; Robinson 1996; Huntington 1996; Scholte 1997; Epstein, Crotty, and Kelly, 1996; Rodrik 1997; Carnoy et al. 1993; Fligstein 1998; Gereffi and Hempel 1996; Hargattai and Centeno 2001; Hirst and Thompson 1997; Louch et al. 1999; Smith and White 1992; Gereffi and Korzeniewicz 1994; van Bergeijk and Mensink 1997; Meyer, et al. 1997; Keck and Sikkink 1998; Schwartzman 1998; and Sassen 1999.

[5] For a delightful exception, see Watts 2002. See also http://www.theyrule.net. Critical references in the network tradition include Burt 1980; Breiger 1981; Emirbayer and Goodwin 1994; Gould 1991; Granovetter 1995; Padgett and Ansel 1993; and Powell 1990.

Defining the underlying geography of globalization offers a potential and perhaps clearer alternative as it serves as a common denominator across periods and forms of transactions, and arguably it plays a defining role in the shaping of these relationships.

Mapping offers a possible solution to the dilemmas posed by the complexity of both network analysis and globalization. The tradition of data mapping has been popularized through Edward Tufte's beautiful books (e.g., *The Visual Display of Quantitative Information,* 1983). Interestingly, many accounts of earlier periods of globalization relied on such devices; there is a long tradition of using maps to tell a multilayered story encompassing time and space, exemplified by the work of Charles Joseph Minard.[6]

Maps are far from neutral representations of a reality.[7] In fact, our understanding of globalization is shaped by the cartographic politics and conventions that define our image of the globe. But mapping has the advantage of requiring an explicit definition of geographical limits, foci, and units of analysis. With the development of computer graphics and GIS technology, the advantages of maps can be expanded through the addition of data layers that allow ever increasing levels of complexity. Despite the epistemological dangers inherent in mapping, no other technique so effectively and efficiently captures masses of data and relational positions.

Explicitly recognizing the active intervention of our project, we propose to remap the world and shift our geographical understanding from one dominated by geographical and political parameters to one defined by transactions and networks. By providing a multimap history of globalization, this project explicitly hopes to redefine our conception of this phenomenon and its future. The atlas and the archive will provide a coherent and analytical means with which to explore the development and structure of globalization. It will serve as an "instrument for reasoning about quantitative information."[8]

While we possess some information on the growth of exchanges and transfers for some items between certain actors, we have little comprehensive information on how far the web extends, what is being exchanged and transferred, and to which actors the web extends. We also know very little about how the situation has changed over world history. The project is thus guided by a set of empirical questions reflecting a set of theoretical interests. What is the shape and structure of the global web? To what extent has the shape of the global web changed over time? Are there cyclical patterns in these transformations? Have the number and variety of participants changed? Can we

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[6] For illustrations of some graphic principles, see http://www.math.yorku.ca/SCS/Gallery/historical.html.

[7] See the discussion in Black 1997, and Lewis and Wigen 1997.

[8] Tufte 2001, 10. There are already some related efforts available on the Internet. In terms of variety, the Cartography Department of the Sciences Po in Paris is perhaps the most impressive (http://www.sciences-po.fr/cartographie). INA differs from this effort in making more explicit a network model and by allowing access to the relevant data. Lothar Krempel and his colleagues have focused more on representations of networks, specifically those involved in global trade (http://www.mpi-fg-koeln.mpg.de/~lk/netvis/trade/WorldTrade.html). While these graphics may be the best representations of the networks underlying globalization, they suffer from the unavailability of data and from the exclusion of much of the world not relevant to global manufacture. Other relevant sites include http://www.lboro.ac.uk/gawc/links.html and http://www.iscgm.org.

define the major actors in such a changing web over time? How has the nature of the transported units changed over time? Can we identify a set of structures associated with the dominance of this global web? Do all empires look alike at the network-structural level? If yes, what are the patterns of rise and fall of such structures? If not, how have these evolved across time?

While the major goal of this part of the project is to gather and present data, we are also driven by some theoretical concerns. Rather than formal hypotheses to be tested, these are well-informed conjectures for which we seek confirmation.

1. If scales are defined as consisting of both the size and velocity of transactions, we believe that the integration of various parts of the world has occurred in a series of asymmetrical cycles.
2. Within these cycles, patterns of increasingly complex interaction between the various forms of transactions (e.g. trade, telecommunications, and travel) remain little understood.
3. The contemporary world now exchanges, travels, and communicates on an unprecedented scale. Yet a constant and perhaps increasing share of these transactions is concentrated in the OECD and among the elite of the rest of the world. The United States occupies a central position in almost all global networks.
4. This is not the first time the globe has been so connected or that a single power has played a central role. Whether Rome in the early Christian era, China in the fourteenth century, or Britain in the eighteenth and nineteenth centuries, empires have served as the central node of international transactions on a regional if not a global level.
5. The focal point of globalization shifts from the Mediterranean to the Indian Ocean, westward to the Atlantic, and further on to the Pacific. The commodities that serve as the linchpin of the system have also changed from wheat to sugar and slaves to oil and cash.
6. Despite significant differences, these stages of global interaction share a network structure that serves to create, change, foster, and eventually challenge them. Each of these periods and the systems has been characterized by a pattern resembling the spokes of a wheel, with each historical empire at the center and the various provinces barely attached to each other except through their connection to the center. Alternatively, as suggested by one of the readers for PUP, global networks may better resemble a set of gears, each with a central axis, but interconnected at peripheries.
7. In analyzing the international structure of any era, close attention must be paid to historical legacies which may explain the existence on apparently non-functional or non-optimal connections (e.g. with ex-colonial powers).

If confirmed, these findings would have significant theoretical implications. First, the rules of the *longue durée* of international transaction remain constant even as the scope, scale, and intensity of these transformations increase. Second, a centripetal force pulls exchanges and transactions to a centralizing pattern. While we might expect integration to produce a multipolar world, it may actually contribute to the elevation of a single hegemon. Conversely, we may find that such increases in integration occur only under hegemonic authorities.

In addition to its value as a research tool, the atlas and its underlying archive will serve as a pedagogical resource for teaching about globalization at many levels. While intended for use by scholars, our primary audience is broader and includes students and the non-university public. For this constituency, the atlas will serve as an introduction to the contemporary structures of globalization while also giving a bird's-eye view of historical developments in international integration and diffusion. The atlas and its underlying archive will also serve as a pedagogical resource for those wishing to teach classes on globalization. The atlas will be a popularizing tool with which to make broad parts of the population more sophisticated analyzers of current global trends and will also give greater historical and geographical contexts in which to place current events.

The archive will also facilitate hands-on learning for students by supplying much needed global-scale data. The archive will fill a gap with respect to such educational resources. By presenting network data at a variety of levels, the atlas and archive will contribute resources to a new dimension in network analysis in the classroom. This project will make data available to a much broader group of scholars than the one that is currently working on globalization.

Methods and Content

Obviously, no single individual possesses the expertise to produce even a handful of the maps and databases we have in mind. The core of the project's mission is to coordinate efforts by the appropriate historical, regional and topical experts. As a first stage in the process of finding and contacting such experts, the project named an advisory board to oversee the project. [9] In collaboration with the advisory board, we will be contacting likely candidates to produce the data required, in turn, to generate the maps and databases. Obviously, as we move back in time, the concept of "datum" will need to be stretched. The archive will feature either partial records, or basic scholarly consensus regarding the direction and intensity of connections.

During 2003, PIIRS will make proposals to several foundations requesting research support. We would use resulting funds to sponsor research projects covering our various areas. The largest portion of our requested support will go towards grants to appropriate experts who will be charge of producing the actual data. Researchers donating data sets will be named associates of the project. Upon donating data, they will be asked to sign testaments as to the authorship of the data sets and the rights to control them. The project will fund associates' projects to either improve or create data sets. Funding will be competitive among associates with annual application cycles. The project will nominate a six-person board from the advisory board who will serve a two-year term during which they will not be eligible for archive funding. We will post an announcement calling for proposals in the appropriate websites and journals and will also recruit for particular eras and regions. The board will make the final selections of proposals to be supported**.** Special emphasis will be placed on

[9] Members include Princeton University History, Politics, and Sociology faculty as well key staff from the Library and the Office of Information Technology. External members include Richard Appelbaum (UCSB), Jerry Bentley (Hawaii), Jeremy Black (Exeter), Manuel Castells (UC Berkeley), Christopher Chase-Dunn (UC Riverside), Saskia Sassen (Chicago), and Charles Tilly (Columbia).

supporting graduate student involvement as well as the participation of underrepresented groups and researchers from institutions without significant research funds.

Archiving Data

In the first stage of the project, most of our attention will focus on the archive and on gathering and cataloguing data and interacting with our virtual public to produce some preliminary maps. To assure the most efficient use of the information, data will be catalogued according to several criteria (e.g., author, countries, variables, years). As is standard, we will document all databases with the standard metadata information. Once complete, data sets will be able to provide users with at least four types of information:

1) Distribution of geographical points of origins and destination as well as the distribution of requested attributes.
2) Exchanges between points by time and form of transaction.
3) Topology of exchange networks as well as other bounded objects (e.g. nation states).
4) Maps and graphics with differing layers of temporal frames, periods, degrees of resolution, and synchronic layers.

A version of the website is already developed and provides data on contemporary globalization (www.princeton.edu/~ina). Some data is now available in a fairly primitive format or through a bibliographic links index. During the fall of 2003, we will begin to transform our data and that available in other sites into ArcSDE databases. Those modifications will help determine how the database should be formatted to support interactive mapping, and how existing data structures can be imported into ESRI software. We expect that the resulting data sets will have three different "genres" of information: locations, objects of transaction, and time of transaction. The purpose of this stage is to make the collection searchable, retrievable, and updatable by students and external users. We will then proceed to standardize each dataset. Part of the tasks of the advisory board will be to select a minimal, common unit of data, such as the city, to allow for easier analysis later on. The model may or may not have to be GIS compliant. As we proceed, we will then add a generic mapping utility and provide tools to analyze and visualize the data set mathematically. We will then install some of the data (probably the section on international telephony) as an ArcSDE database on a separate server. We will then explore the ArcSDE data visually to determine how best to display the information. For example, it may be misleading to display two-way telephone service as a series of lines connecting points. Countries shaded by their level of traffic with another country might be a better option. It will also be preferable to make scale-dependent symbol sets of each data layer so more detailed data are visible only at larger "zoomed-in" scales. Next, we will create one or more ArcIMS MapServices to make the information visible to web designers. Finally we will use HTML, Javascript, ArcXML and other tools to create web sites that use the MapServices. The sites will allow those unfamiliar with GIS to use maps to explore the telephone-traffic information. Fortunately, Princeton already has the necessary software to support the project, and we have or will soon have the training necessary to develop the applications. Once this preliminary work is done, we will apply the same techniques to other data categories in the archive.

Displaying Data

We have also been working on the structure of the website as a whole and the generation of some sample maps based on contemporary data. To give an idea of what the final INA online mapping system might look like, we are developing a sample web interface for interactive mapping http://www.princeton.edu/~ina/interactive_maps/index.html, and http://gisserver.princeton.edu/website/miguel21, examples of the kinds of graphics that the archive might produce http://www.princeton.edu/~ina/infographics/index.html, and short presentation on relevant themes http://www.princeton.edu/~ina/thematic_presentations/index.html. (Note that these require or are better viewed with Internet Explorer).

At its first meeting in April 2003, the advisory board discussed problems inherent to mapping. We will need to make choices regarding representation of the flows. For example, we may wish to illustrate the velocity or ease of flows depending on the technology available and the complexity of accomplishing such. We will need to determine if we wish to maintain a single global view or if we can focus on particular areas. Place names have changed and even the geographical meaning of the same names may also change; geographical nomenclature is far from neutral and often carries significant historical and political connotations. We, therefore, will need to construct a "historical gazetteer" that will reference across epochs. To the extent possible, we are committed to producing a multicultural and multilinguistic set of representations.

The dilemma caused by the contradiction between precision and parsimony haunts all scientific enterprise. As the project proceeds, we will need to make many decisions regarding what to map and in what detail; we will need to distinguish between data that have nothing to do with globalization and that which are relevant to the project.

The following general guidelines will define the earliest stages of the atlas:

1. While the project will seek to create new data sets, our major emphasis will be on gathering and organizing already existing information.
2. While the heart of the project will be quantitative information, we also will need to highlight qualitative or episodic elements in this history of globalization. One obvious example is the fall of two cities, Constantinople and Tenochtitlán, which heralded a radical shift in the direction of European trade and conquest.
3. Where quantitative information on a phenomenon is not accessible, we will first make available whatever partial data is available. When mapping such phenomena, we will be guided by expert advice on the historical consensus.
4. We are wary of an inherent Eurocentric and modernistic bias in the selection of data and maps. Such bias may be due simply to data availability, it but could also stem from the makeup of the board. Possible solutions may include an emphasis on pre-sixteenth century developments, a conscious effort to explore what is going on outside the "usual suspects" of globalization, and, most importantly, a broader recruiting effort for our associated scholars.
5. We will need to distinguish between the process of globalization and its product. Similarly, we must distinguish between flows and resulting stocks, between incidence and infection. A balance, then, must be struck between maps that focus on transactions in

and of themselves and those that address the results of transactions. We may, for example, wish not only to document the flow of the materials and technologies needed to make a factory, but also to present a count of factory locations at particular moments in time.

6. The multinodal flow of influences and transactions must be recognized. No matter how asymmetrical these may appear, the interaction between the different flows and the directions thereof makes globalization worth studying in and of itself.
7. Methods and visualizations that can take into account both geography and chronology must be developed. Possible ways of categorizing the different forms of interaction include:
   a. the structures along which interactions take place; the natural and fabricated geography of globalization;
   b. the machines that fuel the interaction, or the means through which this integration takes place: transport and communications systems;
   c. the processes involved in the interaction, or the actual forms of interaction: trade, invasion, and migration;
   d. the content of integration: goods, services, ideas, and people; and
   e. the network of interactions themselves or the resulting pattern of interactions.

Mapping Historical Globalization

With these issues in mind, we propose the following, nonexhaustive list of maps. Note that there may be significant redundancy across some of the maps as we will sometimes be using the same data to indicate different processes. Railroads and air links, for example, are simultaneously the product of globalization, the carriers of globalized products, and the symbols of a new international integration and will t[illegible]be represented on those maps and perhaps others.

Geology: We will begin with relief maps of the basic geographical terrain with special attention to significant geological shifts from volcanic explosions to silting of ports. A map of temperature zones (and shifts therein) will accompany this section. Given the critical importance of water navigation, we will also include a map of the major wind currents as well as indications of the direction and navigability of river flows. Finally we will include a series of maps indicating deposits of critical minerals for different time periods (e.g., copper in the second millennia BCE, oil in the twentieth century).

Fauna and Flora: Using archeological and historical sources, we will map the availability of different animals and agricultural goods in different periods. We will also include maps of the diffusion of such resources. Candidates for mapping include the diffusion of major cereals and other foodstuffs and the transfer of animal stocks (and their elimination).

Transport and Communications: Depending on the period and the relevant technology, we will provide maps of transport routes (caravans, sailings, roads, railroads, air links). A connected set of maps will produce indications of the time of travel and associated costs. A similar set of maps will provide equivalent information for various forms of communications. Examples of these would include a map of major monsoon-driven routes, mountain crossings, the Silk Road(s), and contemporary transport systems.

Empires: These maps will be similar to the standard offering in historical atlases. A series of maps will document the creation and dissolution of empires that have played a significant role in global integration. These include the Macedonian, Roman, Chinese, Arab, Mongol, Spanish, and nineteenth-century European empires.

Wisdom and Health: Since the first centuries of the Common Era, various sites have played a critical role in defining and diffusing scientific and artistic knowledge. Cambridge, Constantinople, Cordoba, Cairo, and Chicago have served as the centers of a global network of experts and adherents. We will map these links and the transitions from one era's scientific capitals to others. Examples will include leading universities, flows of international students, major hospitals, contemporary medical tourism, flows of pharmaceuticals, and the establishment of leading museums and the flow of art to and from them.

Services and Factories: Urban centers have also served to provide provisions for markets of goods and services. These "middle-urbs" have served as key nodes in global exchanges. We will map those major markets as well as more contemporary versions such as leading stock markets and the headquarters of global firms. A parallel set of maps will display central production sites in global commerce. Examples would include offices of early banking houses and more contemporary groups such as American Express and McKinsey Consultants as well as the manufacturing locations of critical manufacturing inputs (from looms to transistors).

High-value/Prestige Goods: Certainly during earlier stages of global trade, luxury goods led the development of exchange networks. In some cases, these still represent important parts of global trade, particularly in the case of the illegal drug trade. We will map exchanges in such goods as obsidian, gold, silver, gems, feathers, spices, and cocaine. Maps will offer information on creation/manufacture, transport, and consumption.

Low-value/Bulk Goods: Such goods are important in defining the effects of globalization on the mass population. Perhaps the first elaborate exchange network was in tin and copper (ingredients for bronze). Bulk food goods such as wheat/maize/rice also developed early. More recently, industrial commodities (as well as foodstuffs) have become predominant. The choice of which goods to map will be partly driven by historical significance (e.g., cotton) and by theavailability of data.

Manufactured Goods: At different stages, various forms of manufacture have been central to global trade. In the earliest form of a trade network, weapons were perhaps the most critical good (and the arms trade remains an important part of world trade). Later, textiles were central but were then supplanted by heavier industries and capital goods. The two most important contemporary exchange networks are in electronic goods and automobiles. For the latter, we will create maps detailing the international integration of production.

Coinage, Investment, and Capital Flows: Trade has often benefited from the creation of a global currency standard accepted across a variety of regions. International transactions would be practically impossible without such accepted tender. We will map several examples, including Roman coins, Spanish silver pesos, British pounds, and American dollars. We will also attempt to map the

earliest incidence of institutions such as letters of credit. Foreign investments and lending are almost as old as trade in actual goods. We will map "capital centers" for different eras as well the general flow, direction, and forms of financial resources.

Mass Migration: Beginning with the initial move north and east from Africa, global history has been shaped by mass migrations. In the first set of maps in this category, we will track prehistorical mass migrations through recent research using DNA mutations. We will then concentrate on several specific examples, including the Indo-European invasion and that of the "barbarians" into Europe around 300–500 CE, the flows of migrations into South Asian, the "Hansization" of China, and the predominance of Bantu groups in sub-Saharan Africa. Another set of maps will concentrate on the peopling of the Americas and the Pacific. A final group will look at the special case of historical and contemporary nomadism.

Ethnic and Political Diasporas: This section will include maps of ethnic-specific migrations, such as the Jewish, Chinese, Indian, Lebanese, and Armenian exoduses. A related group of maps will focus on the great migrations across the Atlantic and Pacific in the nineteenth and twentieth centuries. Another set will concentrate on flights from political and religious persecution that have had a significant effect on global developments. Some of the latter include the Protestant expulsions and migrations in the seventeenth to eighteenth centuries, the intellectual exile from Nazi Germany, and more contemporary examples such as Soviet *refuseniks*, and Cuban and Chilean exiles.

Slavery: This set of maps will concentrate on forced migrations with special attention devoted to both East and West African slave trades. We will also look at the special case of the Ottoman Empire. Contemporary maps will focus on a wider array of forced migration with special attention to the flow of sexual labor.

Free Labor and Travel: The free movement of labor is a relatively new phenomenon, and these maps will therefore concentrate on contemporary labor flows. A parallel set of maps will focus on the creation of contemporary tourism. Examples will include the network of Filipino guest workers, the labor markets of the oil-rich Middle East, the postcolonial movements to Europe, and the special case of the Rio Grande frontier. On tourism, we will identify macro flows to global sites and the location such institutions as Club Meds and amusement parks.

Diseases: The transmission of diseases has been one of the most obvious examples of globalization. We will examine only those with major historical impact such as the sixth- to seventh-century plagues, the Black Death, the "American Genocide" of the sixteenth and seventeenth centuries, cholera, influenza, as well as more recent examples such as Aids and SARS. We may also wish to map other health-related diffusions including obesity and antismoking legislation.

Conquests and Wars: This set of maps will analyze the expansion outside centers of military power and pay special attention to the creation and development of frontier zones. As with the maps of empires, this section will look very much like a standard historical atlas. More contemporary maps will also include peacekeeping and forward deployments of units.

Religions: This section will map the expansion of major global religions with special attention to missionary movements and the creations of "conversion frontiers." It will also include maps that

represent the diffusion of foundational texts (translations, publishing, etc.) and trace major pilgrimage sites from Mecca to Compostela.

Languages: The maps in this segment will begin with the initial appearance of writing systems and then proceed to the diffusion of alphabets and writing (and printing) technology. Some will depict shifts in global distribution of languages and the creation of "world languages."

Aesthetics: This section will map the spread of literary and artistic styles across the globe, including architectural developments, musical styles, and mass media. Examples include Greek amphitheatres, Hindu and Buddhist temples, the development of Gothic and Baroque styles, the diffusion of Islamic art forms, the globalization of opera in the nineteenth century, and the "Americanization" of mass media.

Politics and Policies: These maps will track the diffusion of ways of seeing and understanding the material world as well as prescriptive strategies. Candidates include the Communist International, Islamic fundamentalism, contemporary neoliberalism, environmental protection regulations, new global jurisdictions, and extradition treaties.

Animals, Steam, and Nukes: These maps will show the distribution of animals and appropriate technologies for transport and agriculture. We will pay special attention to how the diffusion of these resources and technologies makes integration possible.

Technology: This section will map the diffusion of certain techniques and forms of engineering knowledge. It will include maps on navigation and production technologies (e.g., sailing ships, the compass). A subsection will map differing travel times and connectivity between critical parts of the globe.

Weapons: Beginning with the chariot through the development of tanks and missiles, weapons have been at the forefront of technological and political diffusions. This set of maps will document the process across the millennia.

Cultural Carriers: Beginning with the diffusion of writing, particular forms of expression have carried ideas across the globe. We will give particular attention to contemporary technologies, such as newspapers and television.

Consumption Centers: Markets and locales where new consumer goods become available also serve to diffuse global cultures. Early examples might include monasteries and the publication of special texts. We will pay special attention to central markets and, in more contemporary times, global chains (e.g., Gap) as well as ethnic restaurants. For the modern period, we will focus on the penetration of information sources such as CNN and the *Wall Street Journal*, as well as media in opposition to these trends.

Maps of Networks: This set of maps will provide a summary of the connections described above. A subset on power configurations will feature informal empires and alliance systems, such as those seen during the Reformation, the Anglo-French wars, and the cold war. A section on commodity chains will describe global assembly lines and marketing systems. Another set on trade cycles will

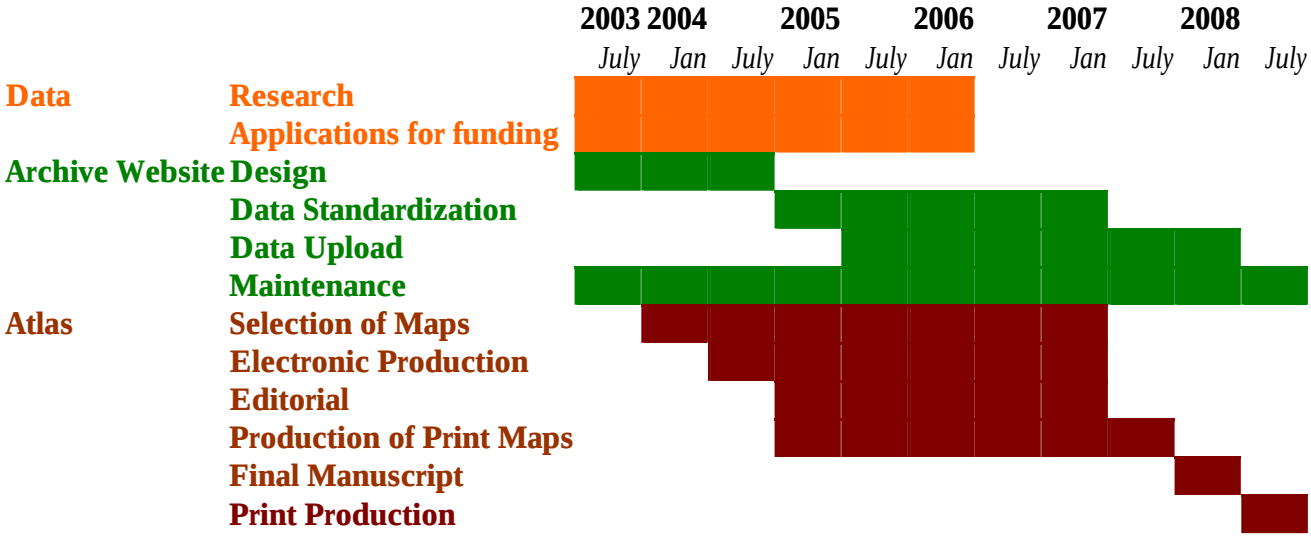
describe links between production and exchanges across the globe. Another on cultural zones will define areas interlinked by a series of exchanges and the diffusion of cultural standards and norms. A set on technological grids will focus on telephone, telegraph, and Internet connections.

Schedule

The first stage of this project began in 1999 and has already produced papers presented at several professional conferences. One article focusing on telephone communications appeared in the *Washington Quarterly* in spring 1999. In conjunction with several colleagues at other universities, INA also organized a special issue of the *American Behavioral Scientist* on "Mapping Globalization" (July 2001), which has received considerable attention and has been widely cited.

The first meeting of the advisory board was held in Princeton in April of 2003 and produced many of the ideas discussed above. Subcommittees of the board will meet periodically and a full meeting will be held in 2005. We are awaiting a preliminary contract from Princeton University Press for the atlas which has already received three very positive reviews[10]. During the coming year, we will focus on contacting scholars for possible production of data as well as on applications for funding. The design work on the website will continue. Beginning in 2004, we will begin preparing the data model for all future archive entries and hopefully begin loading the data sets. The selection of maps for the published atlas will begin in 2004 in conjunction with our efforts to recruit scholars. As the data come in and we begin the design process, we will also work on the production techniques and editorial protocols. The archive should be well functioning by 2005 at which point we will also have some map plates ready for inspection. We expect completion publication of the atlas by 2008.

Preliminary Schedule



Site and Personnel

[10] These have given the Press permission to provide their names: John Campbell (Dartmouth), J.R. McNeill (Georgetown), and Kenneth Pomerantz, UC Irvine).

Princeton University is uniquely qualified to host this project. The University has provided the startup funds for the project and has made available considerable overhead support. The University will continue to do so in conjunction with the new Princeton Institute for International and Regional Studies. PIIRS will house all personnel associated with the project. The University's Social Science Reference Center at Firestone Library, the Academic Services unit of the Princeton Office of Information Technology, and the Educational Technologies Center are currently assisting in the further development of the archive and will also participate in the preparation of the atlas.

The P.I., Miguel Centeno, possesses the scholarly and editing experience to guide the project. He has managed several organizations, has produced several academic volumes, and created a six-hour CD-ROM based on his course on "The Western Way of War." He has also managed the INA website for the past three years.

The project also has an advisory board. Roughly half of the project's advisory board consists of Princeton University faculty and staff, and the other half, an international group of scholars. As currently constituted, the board is U.S.-dominated with a small European presence, but we will seek to broaden representation (see footnote #9).

The project will also hire a Publication Project Manager and a Website/Database Manager. Each of these two half-time positions will be responsible for the production of the atlas and the archive respectively. For the first, we will seek a publishing expert with considerable editing experience. For the second, we will look for someone familiar with both GIS and database design. At critical points in the project, we will also hire more experienced technical consultants to oversee the development of the website. Once we have begun to receive historical data, we will also hire someone with mapmaking experience (in conjunction with the likely publishers of the atlas, Princeton University Press). Finally, we will be hiring undergraduate and graduate students to assist with the functioning of the project's offices and with the processing of data as it becomes available.

Budget

We are requesting $1,283,945 over five years. Nearly half of these funds will be used to support direct research by archive associates and will result in data for the archive and maps for the atlas. The other half will be used for technical and support personnel at the INA office in Princeton. None of the requested funds are intended to supplement or replace the salaries of any of the academic investigators involved.

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