NARRATIVES THAT SOFTWARE NATIONS TELL THEMSELVES: AN EXPLORATION AND TAXONOMY

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ABSTRACT

Looking at prominent centers of software activity across the globe we observe that software developers tell narratives about themselves to explain their identity and their successes. For example, the USA thinks in terms of the cowboy programmer, Ireland the Celtic Tiger, and Israel the commando programmer.   These narratives provide insights into the mental world of individuals and groups in the global software industry.

This paper collects and documents the narratives of software professionals in six nations: Russia, Israel, Ireland, USA, India, and Brazil. The country choice reflects a cross-section of prominent software nations. Using a taxonomy adapted from the political identity literature, we classify these narratives.

The most frequently occurring narrative is the interplay between redemption, national suffering and heroism. Brazil, Russia, India, and Israel offer distinct narratives of redemption and suffering. Israel and the USA use distinct narratives of valor. Among the six nations' narratives, we find that some narratives are collectively oriented while others are individualistically oriented.

National narratives are important for reasons both academic and practical. The literature on comparative human capital focuses on readily measurable data. Therefore, there may be a gap in understanding global competition in software. Narratives influence important decisions, such as where to locate a new software R&D site or where to invest in start-ups. An understanding of narratives helps to shape them.

I. INTRODUCTION

> *Nations are like narratives: nations tell themselves and others stories about who they are and where they have come from.*
>
> Paraphrased from Bhabha, 1990

A traveler visiting software developers in nations around the world will often hear individuals telling stories describing some special national capability endowed in them as software professionals. It is something that makes them unique, rather than just another collective of programmers amongst the world's ten million programmers, and it is often something that makes them better. When certain elements in these stories converge into threads and themes, it is instructive to discuss them as narratives. We introduce the term *national software narratives* for those narratives that software developers, nested in national collectives, tell about themselves.[1]

It is especially interesting to study such narratives now because of the new landscape of global software. A few decades ago, rather than being relegated as simply a subset of the computer industry, the software industry raised its head and developed its own 'personality'. Since about 1990 robust software industries began to emerge in countries around the world to compete with the American software behemoth. In the process, many developed their own narratives. Given the prominence of the software industry, a nation's success in software became an important component of its economic/industrial identity; indeed sometimes the core of its national identity.

WHAT IS A NARRATIVE?

Before progressing with our review and analysis, we must address terminology. In the literature we find that national *narratives* are sometimes referred to as national *myths.* In sociological and anthropological scholarship, myths are characterized as stories that gained wide acceptance among people of a certain culture and, as one of the building blocks of culture, endured throughout the nation's (or ethnic group's) history. Often (but not necessarily) myths contain sacred meanings. Myths capture a society's basic psychological, sociological, and metaphysical truths and, as such, reflect the most important concerns of people that belong to some group [Chaitin, 2004; Hofstede, 1997; Levi-Strauss, 1969; McAdams, 1993].

We, therefore, refer to such stories as narratives since our topic is not of sacred stories. Another reason for using the term narrative is that we mainly discuss contemporary stories that do not share the endurable nature of myths. However, part of the contribution of our study is in the contextualization of these software narratives in existing national myths. Hence, we acknowledge that our national narratives contain within them some mythical elements as well. When we use the term myth in the present paper we refer to "a popular belief or tradition that has grown up around something or someone; especially: one embodying the ideals and institutions of a society or segments of society" [Merriam-Webster Online Dictionary, 2005]. In certain places, we retain the original terms used by the authors we review, such as in the case of Schöpflin, a political theorist who treats myths as one of the elements comprising people's national identities [Schöpflin, 2000].[2]

MOTIVATIONS

As Kendall [1996] points out, mythology (and, by implication, narratives) can be used—and has been used--- for descriptive, normative, and predictive purposes. We see two major reasons to

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[1] Notes on terminology: we will refer to the members of the software industry as programmers or software developers. Other terms are: software engineers, software professionals, software programmers.

[2] Since national narratives encompass issues of culture and perceptions, it is important to emphasize what is deliberately not covered here. The vast tracts of literature on cross-cultural value dimensions (such as Hofstede, [1997] or, specifically in the Information Systems literature [Cougar, 1992] are not in the focus of the present paper because they often deal with dimensions deriving from the *individual* level of analysis, while our interest is in the collective nature and origin of national narratives.

focus on stories and narratives: first is the role of narratives as motivators; second is the role of national narratives in percolating outside and influencing investment and offshoring decisions.

First, we look at the role of myth-related narratives as motivators. Myths of destiny motivated nations to sail across oceans, settle hostile lands, launch wars, and send men into outer space. Similarly, myths of rebirth and renewal motivated people to start or join a revolution.

Joseph Campbell, the classic authority on the subject of myths,[3] wrote [1975, p.12]: "Symbols of mythology touch and release the deepest centers of motivation, moving literate and illiterate alike, moving mobs, moving civilizations." Campbell goes on to argue [p. 18, citing Mann] that myths are the root of everything: "The myth […] is the foundation of life, the timeless schema, the pious formula into which life flows…"

One often finds that myths 'reside' in different levels: the individual, family, nation or professional group. Since myth-based narratives represent core beliefs they are capable of shaping individual and collective motivations and directing attention to goals at the individual, the company, and even national levels. Thus, understanding such national narratives will lead to an improved prediction of the collective's behaviors and actions. Analysis of myths and narratives is one of the ways of looking at how groups define their universe; it is a way to look at "[…] the covert part of thinking and the biases, slants and prejudices" [Schöpflin, 2000].

The study of national narratives will improve understanding of the competitive factors among software-producing nations. These narratives create a culture of pride in one's craft and one's community. The characteristics of pride and confidence help form a nation's *cultural capital*, which in turn is part of a nation's *human capital* [Bourdieu, 1986]. In other words, an understanding of national narratives gives us greater insight into a nation's human capital.

There is, in fact, a gap in our understanding of human capital without adequate understanding of cultural capital. Until now, the economic and strategic literature has focused on readily measurable data to examine human capital: national differences were analyzed vis-à-vis human capital measures such as numbers of computer-trained professionals. For example, there are recent comparisons between the three high-tech rivals: the USA, China, and India vis-à-vis their human capital [New World Economy, 2005]. Other objective measures examine the extent of national infrastructure and technology diffusion [Commander, 2005].

A second reason for studying national software narratives is that these narratives influence critical executive decisions. Ostensibly, executive decisions are driven by objective data, such as favorable tax incentives or low wages. Indeed, consultants have developed matrices and frameworks for these decision processes [Bhaumik, 2001; Accenture, 2005; Marriott, 2005]. However, decision makers are also affected by 'soft data', such as national images.[4] At the organizational level, Ramiller [2001] showed how advocating new IT systems is driven by narratives that he called "the Airline Magazine Syndrome."

These national images are fed by several social and cultural elements, including narratives. These narrative-based national images invariably make their way across borders. Executives rely on both hard and soft data to make decisions about which nation should be the destination

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[3] Campbell is well-known in the USA from a series of landmark interviews on PBS-TV in the 1980s.

[4] National image has an analog at the organizational level. The concept of *organizational image* typically refers to the way organization members believe that others see their organization. The realization that both negative and positive organizational images affect organization's internal dynamics, as well as how attractive it is for potential employees and investors underscored the importance of image for executives and researchers alike [Dutton and Dukerich, 1991]. Not unlike big organizations, nations too have images that are only partially directly manageable.

for offshore operations, where to locate a new R&D site, and where to invest in a new software start-up. Indeed, an understanding of national software narratives is useful in "country branding[5]" [Kotler, 2002] which has become important in high technology.

In this article, we chose to focus our data analysis on a cross-section of *six* prominent software nations to examine national software narratives. By *prominent* we mean that these nations are either traditional leaders or important nations in the global landscape of software, as measured by the magnitude of their software industry. We chose the US as the *dominant nation* of the software industry. We chose the three *stars* that emerged in the 1990s, the so-called *Three I's*: India, Israel, and Ireland. We add two other important, large software   nations that emerged since 2000: Russia and Brazil.

II. LITERATURE

There has been academic research at the intersection of narratives, myths and technology. Myths, narratives, as well as folklore, metaphors, and even magic, have all been the subject of some interest in the Information Systems (IS) literature over the years [Markus and Benjamin, 1997; Hirschheim and Newman, 1991; Kendall and Kendall 1993; Kendall and Kendall 1994; Kendall et. al, 2005; Krefting and Frost 1985; Ramiller 2001; and we note an example in the organizational context, Boje, 1991]. For example, Kaarst-Brown and Robey [1999] found metaphors of surfing waves or wildcatting (wildcatting is an American expression for searching for petroleum). Indeed Kaarst-Brown and Robey found that "... magic dragons and wizards are alive and well in organizations…" Kendall and Losee [1986] showed that systems can be documented, after the fact, based on folklore elements such as tales, norms, and habits. Kendall and Kendall [1993] examined heroes in the IS context using a methodology called Dramatism.[6]

In this article, we examine narratives at the unit of analysis of a nation. . Accordingly, our literature review begins at the national level, building on political science literature. This is followed by the professional level, relying on psychological and organizational literature.
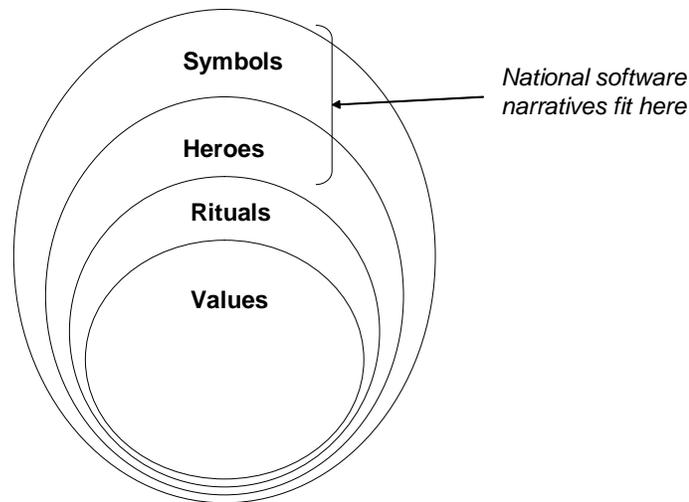
NATIONAL IDENTITY AND NATIONAL NARRATIVES

All national histories can be characterized as myth-history [McCrone, 1998]. In each nation's history there is no such thing as "*real* traditions." Rather, all traditions are invented, constructed, and imagined. Smith [1991] writes that nationalism is an invented doctrine. It is a doctrine invented by Europeans in the early 1800s. An example of its invention is the Gaelic (Irish) revival of the late 1800s, with native sports, nature, local crafts, and ancient pagan heroes, all of which helped foster the new Irish nationalism. Today we see national identities as formed by rather

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[5] Country branding has been shown to influence purchasing decisions. Countries brand and re-brand themselves. Spain has branded itself as a modern, developed country. Britain tried to overcome its stodgy image with an irreverent slogan "Cool Britannia." A success case in high-tech took place in 1997, Costa Rica; with no prior country branding in high-tech suddenly became one of four nations on the Latin America short list for a billion dollar investment by Intel [Kotler and Gertner, 2002] and surprised everyone by winning the investment. Thus, national software narratives, which influence and interact with country branding, influence location decisions. For example, in the following quote the CIO of US-based Juniper has been influenced by the Israeli narrative of software security: "If you look at someplace like Israel, there is good security [education]..." Thibodeau [2005].

[6] Dramatism is a methodology which can be used as an alternative to the traditional content analysis method, involving precise counting of statements and words. Rather, dramatism progresses through a series of questions about the project, such as "What and who is castigated as evil?" allowing the researcher to gain a deeper understanding of the informant and helping with creating the bigger picture.

mundane settings. Edensor [2004] writes about "automobility and national identity," the impact of certain kinds of cars and car styles on the English identity of the 1960s. Certainly, the mythology of the automobile has been important in the United States and on how its citizens see themselves. Thus, as nations emerge they create self-sustaining narratives to build coherent identities [Olins, 2002].

In a broader sense, national identity, myths and national narratives are all part, and contribute to, national culture. One of the most common conceptualizations of the structure of culture is the 'onion diagram', offered by Hofstede [1997] and reproduced in Figure 1. While a detailed treatment of the diagram and its components is beyond the scope of the present article, it is worthwhile to note that both identity and myth fit in the more superficial and thus, more easily observable levels of the 'onion'-*Heroes* and *Symbols*. National myths, specifically, are closely related to what Hofstede refers to as *Heroes*: "persons, alive or dead, real or imaginary, who possess characteristics which are highly prized in a culture, and who thus serve as models for behavior." [p. 8]. Lastly, we should note that like heroes, myths are indicative of the core values that a nation's people hold, but are somewhat less enduring than the former.

Source: Hofstede, [1997]

Figure 1: The Onion Diagram Depicting Manifestations of Culture at Different Depths.

Is a myth rooted in truth, or is it something that — ultimately -- is unrelated to truth? Schöpflin [2000] writes that myths are about perceptions and not historically validated truths. The community members are aware that the myth is not strictly factual; but that doesn't matter, it is the narrative of the myth that is important. However, in order for myths to take hold, they must resonate with the greater public. A narrative that does not resonate will not successfully transform into a myth. The myth has to have authenticity through some relationship to the collective memory. Schöpflin gives the clever example of the Czechs inventing a strong seafaring tradition: this is a myth that cannot endure.

Who controls the myth and the myth-making? Generally, according to Schöpflin [2000], it is the elite who control the communication channels. In modern times, nations (often through governments or other elites) provided a repertoire of approaches to strengthen national identity through symbols, traditions, flags, coins, postage stamps, ceremonies, holidays, street names, statutes, and uniforms. In short, most citizens are surrounded by an endless number of such symbols that together build myths and reinforce a national identity through these myths.

Schöpflin [2000] introduces a taxonomy of national myths which is presented in Table 1. This taxonomy categorizes national myths, and is useful in understanding where myths originate. We will return to this taxonomy at the end of the paper when we use it to classify the national software narratives that we have collected.

Table 1: Taxonomy of National Myths.

1. *Myth of redemption and suffering.* By its sorrowful history the nation will expiate itself; will redeem itself; making a virtue of fatalism.

2. *Myth of civilizing mission.* The nation has been entrusted with a special mission by God or by history.

3. *Myth of military valor of resistance.*

4. *Myth of rebirth and renewal.* An example is the myth of the phoenix.

5. *Myth of foundation.* Marks the start with some special qualities.

6. *Myth of antiquity.*   Who did some accomplishment first?

7. *Myth of territory.* Claims and attachments to territory.

8. *Myth of kinship and shared descent.* Certain genetic transmission (perhaps smarts, genius). Purity of race.

9. *Myth of national genius.* The sense that the nation's peculiar way of thinking, acting and communicating is the superior one.

Source: Schöpflin [2000]

In addition to the first eight myth categories from Schöpflin, we added another one: *national genius.* This category was added based on our preliminary research. Smith [1991, p.73] presents this as a concept found in the writings of Lord Shaftesbury of the early 18th century. He used the language of "the rising Genius of our Nation," referring to Britain.   Smith further notes that Rousseau wrote "the first rule which we have to follow is that of national character: every people has, or must have a character. If it lacks one, we must start by endowing it with one." Herder made the principle of national genius into the cornerstone of cultural populism [Herder, 1968]. Every nation has its peculiar genius, its own way of thinking, acting and communicating and each nation, if that national genius has not been discovered, it must be rediscovered by going back in history.

Why do people have a need to tell themselves stories/narratives? Two central functions of narratives are sense-making and identity formation. Sense making, which is a universal cognitive mechanism, describes the process of the mind attempting to 'fill-in the blanks' or to explain a phenomenon that does not have an obvious explanation (e.g., Weick, 1995). For example, some of the "creation" myths help us make sense of the questions such as 'Why are we here?', while other myths answer questions such as 'Why do bad things happen to good people?' Referring to the taxonomy in Table 1, we can understand how myths of redemption and sorrow help to answer a collective wondering of people as to why they were miserable throughout history. One function of a good myth is that it reduces our anxiety by helping us make sense of the laws and dynamics governing the world around us.

A second function of myths is for consolidation of identity. Following the theoretical framework of Social Identity Theory (SIT), *identity* refers to a core characteristic used by an individual to describe who s/he is. According to SIT, the self-concept is comprised of a *personal identity* component that includes idiosyncratic characteristics (e.g., physical characteristics, personality traits) and a *social identity* component that includes salient group classifications [Tajfel and Turner, 1985]. Individuals classify themselves and others into various social categories or groups such as gender, age, nationality, and organizational membership.

Social identification is the perception of belonging to some human aggregate [Ashforth and Mael, 1989]. People perceive themselves as members of certain social groups and perceive the fate of these groups as their own. Overall, social identification is based on our need to reduce ambiguity about self and others, and assists in answering the old question *Who Am I*? [Stryker and Serpe, 1982] Acknowledging the need to differentiate social identification from related concepts such as cohesiveness, internalization, and commitment, we follow Ashforth and Mael's emphasis on the cognitive element in identification and its manifestation in perceiving a sense of oneness with a certain group or social aggregate.

A central element of social identification is the sense of in-group membership. Turner [1984, p. 530] proposed the existence of a "psychological group," defined as "a collection of people who share the same social identification or define themselves in terms of the same social category membership." Across many psychological groups and situations, people show in-group favoritism towards individuals perceived to be in their group, compared to members of other psychological groups [Hogg and Abrams, 1988; Tajfel, 1982]. Thus, effective national or, for that matter, professional narratives contain unique elements that both enhance individuals' self-perception, as well as enable them to differentiate those who are part of their in-group (organization, profession, nation) from those outside it.

PROFESSIONAL IDENTITY

Professional Identity (PI) is one dimension of work-related social identity. PI is one's self-description in the context of his/her specific profession (e.g., programmer, accountant). PI relates to feelings of coherence regarding one's career, satisfaction, and involvement with one's job in the company [Cohen-Scali, 2003; Marks et al., 2002]. Like the related concept of *Organizational Identity*, PI is also a work-related aspect of one's self-identity. PI, however, encompasses elements that are also external to the organization.

Software developers, like other professionals in the general engineering culture, tend to see themselves as lone wolves. The respected software developer is the daring individual, perhaps somewhat anti-social, who is attached to his computer [Couger, 1992, p.270]. He/she often prefers to work by himself, but of necessity may work in very small teams with peers that he respects professionally. He/she enjoys the intellectual challenge of creatively overcoming or circumventing computer limitations. This last characteristic, of a software artist, is captured in the term hacker, before it became pejorative.

The centrality of software developers' professional identity on the one hand and the relatively loose connection they sometimes have to the employing company on the other hand, accentuated by the ever increasing trends of flexible organizations and virtual work, further contribute to the image of the transportable, self-contained professional [Marks et al., 2002].

OUR RESEARCH MODEL

While there is ample research on both areas that we discussed earlier; on both professional identity on one hand and national myths/narratives on the other hand, we are not aware of research that examines the interaction of the two, particularly in the context of the software industry. We posit that looking at the interactive effects of both national-level and professional-level narratives can advance our understanding of the forces behind software industries in various nations. We, therefore, propose the following model shown in Figure 2.

National
Narratives

•National Industry
Outcomes

•Organizational Actions

Professional
Narratives

•Psychological
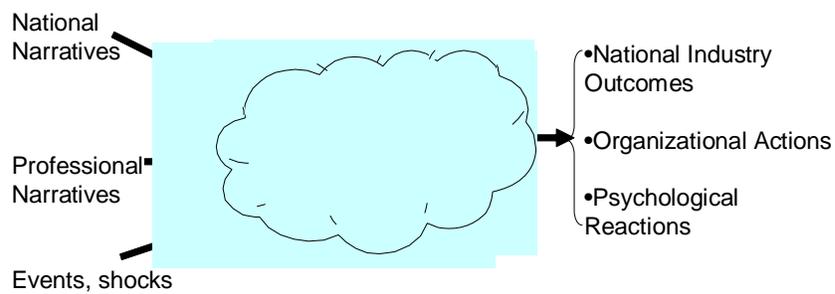Reactions

Events, shocks

Figure 2: The Research Model

We begin with the left side of the model. Within each software nation there is a set of broad national narratives that coalesce to form the national identity. These narratives interplay with the narratives implicit in the Professional Identity of the programmer, most of which are universal. To these we add exogenous variables: significant events, shocks, and crises. Together, these three factors form the national software narratives.

The outcomes, on the right side of the model, are numerous. We list three major trajectories: the nation, the firm, and the individual. At the national level narratives of destiny motivated nations to sail across oceans and send men into outer space. Narratives have the power to energize and direct action. The collective narrative is also present at the level of the organization, the basic economic unit. Thus, effective narratives are likely to have ramifications for organizational performance.

Finally, we come to the level of the individual. Here, too, narratives can affect motivation. Most narratives, national or otherwise, contain positive attributes about the subjects of these narratives. This corresponds to the universal human need for self-approval and self-enhancement. Thus, effective narratives tell us why we are so great and do so in a convincing manner! In other words, narratives can enhance our self-esteem, convincing us that we are worthy human beings. Moreover, those narratives that have elements of mastery in them (i.e., provide explanations of why we are good at certain things, such as the genius myth), have direct bearing on our self-efficacy. Numerous studies across varied organizational settings have demonstrated that self-esteem and, more so, self-efficacy, relate positively to both task-motivation and performance (e.g., Gist & Mitchell, 1992).

Having introduced the theoretical foundations for our study, we turn now to the data.

III. EVIDENCE OF NARRATIVES IN SIX LEADING SOFTWARE NATIONS

In this section, we present the national software narratives of six leading software nations: Russia, Israel, Ireland, USA, India, and Brazil. Our choices reflect our desire to examine a cross-section of prominent software nations. The USA is by far the most powerful software nation and the *mother* of the software industry. To this we add the three *stars* that emerged in the 1990s, the so-called "Three `I's": India, Israel, and Ireland. We add two other important software nations that are also among the most important emerging economies: Russia and Brazil.[7]

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[7] Our choice of nations should yield distinctive results among the nations: Ronen & Shenkar, synthesized a large amount of cross-cultural literature dealing with attitudinal data [AMJ, 1985], to identify eight clusters (e.g. Germanic, Anglo, and Arab) that contained culturally-similar countries; four countries could not be classified into one of the country clusters: Israel, India, Japan and Brazil.

Our data was gathered through primary and secondary sources. The primary data collection was exploratory. The authors used interview research notes from their prior studies in all six nations dating back to the 1990s; they discussed these narratives with dozens of professionals in the software field all over the world. In addition, a limited mail survey of ten Indian programmers from a cross-sample of leading Indian firms was conducted in 2005 to validate the Indian narratives.

RUSSIA

The Russian national software narrative revolves around its supremacy in science. During the Soviet years the Russians were able to launch Sputnik, send men into space, produce nuclear bombs and antiballistic missiles, and manufacture advanced weaponry. Over the years, the Russians built their scientific software infrastructure neck-and-neck with their rivals, the Americans. The Russians see themselves as brilliant and creative scientists, among the best in the world.

Russians believe that they are the best in science-based programming, i.e. developing highly efficient, creative, problem-solving algorithms. They view themselves as able to master any software easily because of their technical background. They believe they can solve any problem. "Russian executives say that their engineers and programmers have worked in solving complex issues to deliver solutions at a fraction of the costs incurred in the United States and Europe" [Goyal, 2004].

Hawk and McHenry [2005] write that the accepted wisdom about Russian software developers is the:

> "[…] excellence of Russia's IT human resources, e.g. in-depth technical skills, R&D experience, experience with complex projects. […] Many Russian programmers have Master's degrees and strong training in mathematics and the sciences. They are said to have a deep ability to solve problems of considerable technical complexity, including creating innovative algorithms and applying scientific knowledge. The Russians frequently cite the first and top placement of Russian programming teams in yearly ACM competitions as evidence of the superior skills of the best Russian programmers."

Indeed, the Russian software developers' sense of superiority in math is reinforced by winning many international competitions. These triumphs are covered prominently in the trade press and repeated frequently by industry insiders. For example, such headlines include "St. Pete Programmers Best in World at Simulation Soccer" [Titova, 2004] and "Russian Universities Educate World's Top Student Programmers" [Chronicle, 2000]. The 2005 public brochures distributed by Russia's national software association, Russoft, includes a detailed listing of the ACM programming contest successes in which a Russian university won the world championship in three of the last five years. In the Russian Outsourcing Conference of 2004, a platform for trumpeting the Russian industry's success, these victories in international contests were voiced and repeated by several speakers.

This narrative is then circulated and absorbed by outsiders:

> "[US-based] Sun [Microsystems] has teams around the world working on similar projects — in countries such as Ireland, India, Israel, and the Czech Republic — but programmers in such countries typically "don't have anywhere near the talent as the Russians" [Azrael and Peterson, 2002].

The second Russian national software narrative is *hardship programming*. During the Soviet days computer time was precious, hardware was unreliable, and operating systems were buggy. In

those days, programmers created tight code that was very elegantly written to minimize computing resources as much as possible. The lack of resources meant that programmers needed to be creative in building workarounds since there were never enough resources or reliable interfaces. We see this narrative perpetuated today in a quote in the professional journal *IEEE Spectrum*:

> *"Khand says that he found his company's talent in Russia and China where constraints of space and computing power had trained engineers to find elegant solutions"* [Ross, 2004].

ISRAEL

Israel's central software narrative stems from the collective mandatory military experiences that all Israeli software developers lived through prior to beginning their professional careers [De Fontenay and Carmel, 2004; Ariav and Goodman, 1994]. Within the taxonomy of Table 1, this is a narrative of valor. Israel has survived many decades of hostility from its neighbors and it has translated elements of its military success into success in software.

The Israeli narrative links software to the military as follows: the compulsory military service provides superior professional skills that are similar to 'business training.'   De Fontenay and Carmel [2004, p.51] write about this linkage:

> *"Those selected for positions of military leadership (whether they be in technical or combat areas) are asked to shoulder important responsibilities quickly—and at a very young age. Within the relatively flat organizational structure that is the Israeli military, they are asked to assume complete responsibility for their unit/domain, to work long hours, to respond quickly, to be flexible, to improvise, to do whatever it takes to get the job done, to think about the strategic objectives rather than about their specific job description. As a result, they develop a strong sense of responsibility. They are often given very challenging, sometimes impossible, tasks. They learn to work in a hierarchy, but with informal communication, so that they can communicate their opinions to their superiors. They learn to work in teams and form early skills in coordinating and managing within a team. Thus, they learn team leadership skills at an early age."*

The authors point out that these qualities are those that are desirable in tech startups and, therefore, many software developers have small "startup-like" experience before joining the workforce. De Fontenay and Carmel [2004, p.52] continue:

> *"[…] many interviewees asserted that Israeli teams develop products more rapidly: "It's the emphasis placed on getting things to work in the military. It may not be pretty, but it will work."   Although the Israeli military is far from a small organization, many of its units function rather independently. Consequently, the organizational skills developed in the military fit a small-to-medium sized operation better than in a large operation. Indeed, there is some evidence that Israelis prefer smaller organizations and startups. Loyalty to the group, flexibility and lack of hierarchy (all characteristics of the military) are more likely to be preserved in a small firm-- especially a startup."*

The New York Times repeats this theme in an article pointedly titled: "I Got My M.B.A. in the Israeli Army" [Cummings, 2005]:

> *"A lack of resources means soldiers have to be precise, outwit their enemies with greater skill and regard themselves, as members of a smaller force, more personally accountable for their actions - all elements inherent in making a business thrive."*

The second, though less important, Israeli software narrative is that of group attachment and loyalty. Shahar and Kurtz [1995, p.73] write that Israel is a culture:

> *"[…] in which individualism exists side by side with strong group attachments. Israelis identify themselves as members of groups, are loyal to group members, and are concerned with the well-being and collective interests of the group (e.g., work teams, friendship circles, ethnic organizations, and army units)."*

The Israeli group attachment, or *collectivism,* arises both from the military experience (loyalty to the unit) and from the country's socialist-pioneering heritage of nation-building. This is a loyalty that Israelis use to explain their devotion to task and the relatively lower turnover rates in Israeli firms.

IRELAND

The Irish national software narrative is captured in the evocative label the *Celtic Tiger.* This is the label given in the 1990s to Ireland due to the remarkable success of Ireland's high tech/ software industry on the world stage. Ireland has emerged from a small, inward-looking, late-industrializing economy to a new feeling of national wealth and self-confidence. Of course, the label itself is fused nicely with a national myth: The Celts (pre-Norman invasion; before the year 1170) linked to the modern-day high-tech Irish.

A key component of the Irish national narratives was developed by the republic's official agencies. These agencies present statistics showing that Ireland is either the "first" or "second" (depending on the source) largest software exporter in the world [Enterprise of Ireland, 2005]. A related statistic shows that 60% of all packaged software sold in Europe is manufactured in Ireland. These numbers have become an integral part of the Irish narrative of software success.[8]

The overnight success in software led the Irish to look around, reflect, and search for reasons for their success. This led to the building of the Irish narrative of special social capital: the Irish get along with each other well, are non-confrontational, work together well in teams, and interact well across team boundaries and across organizational boundaries. This fits in with another explanation of national success: Ireland's leadership among industrial economies in its adoption of flexible and team-based approaches at work.[9]

USA

The traditional American national software narrative revolves around its hegemony in software. The modern software industry was largely founded and developed in the United States. Americans have been regaled with the heroic tales of "the founding:" the stories of Bill Gates, Steve Jobs, Mark Andreessen and others. Americans see themselves as global leaders of the

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[8] These statistics are technically correct, but hide the fact that Ireland has been a re-exporting stop for major foreign software product companies. The dominance of these figures within European statistics stems, in part, from low-level manufacturing (such as creating CDs and packaging) which were performed in Ireland for tax purposes. Much of the software itself is not touched.

[9] This myth of unique Irish team structures was criticized early on: Geary [1999] debunks all of these (myths) based on his survey. For example, he argues that the greatest concentration of novel workplace innovations is actually in foreign high-tech firms that had recently settled in Ireland and thus the new work norms in evidence are more likely to be Silicon Valley norms rather than Irish norms. In the same vein ó Riain [2000] writes that: "There is at least some evidence of significant diffusion of teamwork at the level of the organization of production, although not sufficient to warrant the more enthusiastic claims made on Irish industry's behalf."

industry. Many of the key computing inventions came from the US, such as the internet and the mouse. America's firms, such as IBM and Microsoft, dominated the global industry and to this day Americans are somewhat reluctant to buy software from outside the country. Americans created the first legendary hub of computing, Silicon Valley.

Thus, using our taxonomy of Table 1, the American narratives derive from the "act of foundation" of computing and from antiquity of computing. The antiquity narrative is perpetuated in tangible ways; Silicon Valley, along with Boston, house computer museums that were both built around 1990. Closely linked to the act of foundation is that America sees itself as shouldering the responsibility for the global software industry, initiating and sponsoring many of the international committees for computing governance. Using our taxonomy, this exemplifies the narrative of the civilizing mission.

But the central narrative of the US software narrative is the software *cowboy*, evoking a macho, rugged, slightly reckless individual. The cowboy is a blend of American individualism, the entrepreneurial culture, and the iconoclast software professional culture [Carmel, 1997]. The individualistic element is that of the lone programmer, the "hacker," a term that has become pejorative since that article was written. The hacker sees himself as a wizard and although a loner would occasionally consent to work in small teams. Computer columnist Dvorak [1993] lovingly wrote in a computer magazine that:

> *"…the best code is still done by teams of young American coders eating pizza and drinking Coca-Cola."*

The entrepreneurial narrative is pervasive in much of American life and is manifested prominently in computing. The personal computer wave that began in the late 1970s was an epidemic of the technological entrepreneur: Apple, Microsoft, Lotus and others were celebrated and became infused in the popular culture. It is a culture, as Carmel writes [1997], which "*… stresses competitiveness, risk-taking, independence, and creativity. Competitiveness reflects a free-market, aggressive outlook that honors those reaping fortunes."* This narrative was temporarily strengthened in the late 1990s by the dot-com boom.

Finally, these broader national narratives interplay with the professional narrative. American programmers are stifled by programming structures that restrain their creative abilities and reduce their productivity. By the 1990s, American programmers were dismissive of the growing software engineering paradigm that introduced factory approaches as well as the process maturity movement. Soon the agile software movement (e.g., Extreme Programming) began emerging in the US. The agile software development philosophy addresses the narratives that American software developers tell themselves about why their traditional ways were superior.

INDIA

The Indian national software narrative begins with the imagery of the "untangling." That is, that India, with its vast human potential, was closed off from the world by two walls; first by the limitations of connectivity, and second by India's stifling bureaucracy and its "permit Rajs" wrapping every decent business in endless layers of red tape. Both of these were untangled in the 1990s. The first was untangled by the internet and the second by the government's economic liberalization that began in 1991. Outsiders have embraced this narrative, including a leading American observer quoted in Business Week [Kripalani, 2003]:

> *"India has always had brilliant educated people, now they are taking the lead in colonizing cyberspace."*

The CEO of GE, the company with the largest foreign presence in India's IT industry said: "India's treasure is its intellectual capital." [Hindu Business Line, 2002].

How do Indian programmers express this narrative of vast human potential? One young Indian software developer articulated the narrative as follows:

> *"We work very hard. [...] the Indian [educational] system is very competitive. It's not only the elite universities [that are competitive] even in the small tech schools, students will learn every little trick with C++."*

Another narrative is the *transformation*. Until the 1990s India was known as a place for shoddy quality. Indian software organizations embraced the CMM quality process methodology and became the leaders in its use within the software industry. Indians believe that their firms produce the highest quality software.

Indians also tell themselves narratives about India's global location. Being far from any major client in the USA or in Europe is actually an advantage due to time zone differences. Thus, it is actually beneficial to be geographically distant because work can be done during the client's nighttime to be ready for the client the next morning [Vijanyan, 1996].

Finally, the remarkable Indian success generated an enormous sense of pride in its software industry. This is so pronounced a sense of national pride that it has generated a narrative of national mission. "IT is driving India's boom, and we in the younger generation can deliver India from poverty," says a 22-year old Indian IT student in one of India's elite universities [Kripalani, 2003]. That is, the young Indian programmers see their role not just in writing good code, but in saving their nation.

BRAZIL

Brazil's national software narratives stem from the country's turbulent economic history. This experience was a collective economic hardship creating a unique kind of Brazilian software narrative of excellence in financial information systems. Behrens [2002], writing about the Brazilian software industry, explains:

> *"Brazil has experienced many years of erratic monetary policy and ensuing inflationary spurts that required, at times, daily micromanagement by the Central Bank. Domestic banks were thus spurred to deal with interest bearing current accounts, very fast clearing facilities and flexible enough bank automation as to accommodate a regulatory environment in a state of flux."*

As a result of these erratic times and the adjustments made by Brazilian software developers, we found the following narrative in field interviews:

> *We Brazilians know financial systems really well. The reason we are strong in financial & banking systems that we had horrible hyper-inflation. People were shifting money around by the hour. We had to react by building excellent financial information systems.*

And sometimes, the inflation narrative was followed by the currency change narrative:

> *We had several currency changes in just 15 years. The Europeans struggled with just one Euro conversion (ha!). We did this many times. Once the government gave us only 3 days -- a weekend -- to change the currency on our information systems!*

The Brazilian national software narrative has two implications. First, it builds pride inside the Brazilian software community in its ability to perform under conditions of hardship. Second, the narrative has focused the national positioning of Brazil's largest firms on financial systems, though still with limited success abroad.

IV. SYNTHESIS AND DISCUSSION

Our contribution is, first of all, in conducting a preliminary collection of the many national software narratives. Next, we classify these in Table 2, using the taxonomy of national myths. As can be

seen from Table 2, all generic types manifest themselves, at least once, among the narratives of the six leading nations of the global software industry. From an historical perspective this is interesting: a young industry, software, readily assimilating millennia of myths into its narratives.

The most frequently occurring narrative is the interplay between overcoming national suffering (the first type in Table 2) and heroism. Brazil, Russia, India, and Israel have distinct narratives of redemption and suffering. Israel and the USA have distinct narratives of valor; but the programmer's heroic imagery is just below the surface in any of the other narratives of redemption, Brazil, Russia, and India, that were not specifically classified as such.

By looking at the core elements of the six nations' narratives, we make another interesting observation: that some narratives are collectively oriented while others are individualistically oriented. Themes that occurred among Indian software workers included emphasis on community-level issues, such as the heritage of being colonized or the striving to transform the nation. In Ireland, the emphasis seems to be on smaller group-level themes, emphasizing the Irish workers' perception of being able to get along well in work-teams. In Israel there is a strong emphasis on the role of the military experience as providing training in working under conditions of discipline and hierarchy, as well as the value of camaraderie and team-interdependence. On the other hand, the narratives emerging from the USA, show strong individualistic flavor, first and foremost through the cowboy image. Interestingly, Russian narratives are also at least partially individually-oriented, emphasizing the role of the scientific-genius laboring in the lab.

Our data also provides preliminary support for our research model in Figure 2. First, we find an interaction between the national narratives and the professional narratives. The American cowboy narrative is the best example of this interaction. The third input of our research model, the external events and shocks, manifests dramatically in the Brazilian narrative of resilience in the face of the hyper-inflation shock.

Table 2. Classification of National Software Narratives
Using the Myth Taxonomy

Common Myth	Classification of national software narratives from the six nations in this study
Redemption and suffering	▪ Brazil – Overcame hardship during inflationary times. ▪ Russia – Overcame hardship during isolationist times of the USSR. ▪ India - More competitive educational environment; work harder than others. ▪ Israel - Lack of resources lead to clever ways to outwit competitors
Civilizing mission	▪ USA – Guiding beacon of software world ▪ India – Software will deliver the nation from poverty

Common Myth	Classification of national software narratives from the six nations in this study
Valor and resistance	▪ Israel – Commandos morph into software commandos; good preparation for small teams and entrepreneurship; overcame hostility to succeed in software. ▪ USA - The cowboy programmer is a fusion of the entrepreneurial competitiveness and the heroic hacker.
Rebirth and renewal	▪ Ireland – The Celtic Tiger, now the largest software exporter in Europe. ▪ India – Freed from the shackles of the India bureaucracy; the emergence of India Inc., the software superpower. The transformation into a high-quality destination.
Foundation	▪ USA – Americans were instrumental in every important software development.
Antiquity	▪ USA – The mother of the software industry.
Territory	▪ India – The advantage of being far away in order to take advantage of time differences.
Kinship and shared descent	▪ Ireland – The social capital of getting along with each other. ▪ India – Strength is in numbers ▪ Israel - Loyalty (low turnover); teamwork
National genius	▪ Russia – Supremacy in math and science ▪ The Israelis, Americans, and Indians all think that they have a special genius.

We learn from the literature that myths are dynamic and evolving, some intensify while others wither. Over the course of history, the communities with strong myths were resilient and survived. Of our limited sample of six nations, we note that the Irish narratives are the weakest and most sparse. We speculate that this will negatively impact the vitality of the Irish industry, especially as it now enters the era of being a high-cost producer. The American cowboy narrative seems weaker now than it was some years back; and we see no emerging new narrative to replace it. As America looks at strong competition in software, this could be an omen.

We learn from our data that there is also some humor in national software narratives. This seems to be mostly dark, often self-deprecating, humor.[10] At the same time the programmer is heroic.

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[10] We found a bitingly humorous list of 24 narratives that Russian programmers tell about themselves. Two examples: 1) Russian programmers remember by heart both English and

Although common wisdom these days is that humor is healthy such dark humor may be self-fulfilling and limiting, rather than motivating.

FUTURE RESEARCH

Our future research questions are many since research into national software narratives seems scarce. We see several avenues for productive research.

First, as mentioned, we recommend studying more countries. We indicated that China and Japan would be the most likely to yield interesting narratives.   Other countries, less prominent in software, may yield no real narratives, which may also be of useful information.

Second, there is a need to perform stronger validation of these narratives. There are a number of possible methodological approaches: survey instruments, using sociological approaches to the study of folklore, or by the study of narrative texts drawing on the Critical Studies discipline. Closer to home, some IS scholars facing similar methodological challenges took multi-method approaches, Brugha, 2004; Kendall & Kendall, 1993; Kendall & Kendall, 1984.[11]

A third related point is the need to study how narratives change, grow, develop, and wither over time. This necessitates using a longitudinal approach. Such a longitudinal design will enable to empirically test some of the propositions that would be derived from our research model (Figure 2) as well as our fourth point elaborated below. Longitudinal design would also be especially well suited for examining whether environmental changes (e.g., changes in the global market or in a nation's economy) influence the content and spread of national/professional narratives.

Fourth, it would be interesting to further explore the concept of what makes a national/professional narrative successful or effective. In terms of outcomes, a successful narrative is one that is both enduring (i.e., survives over long periods of time) and sufficiently widespread among the relevant population. These two characteristics bring to mind the fairly recent concept of *Memes*. This term, that first appeared in Richard Dawkins' 1976 book, "The Selfish Gene," can be described as the a self-propagating unit of social evolution, the cultural equivalence of genes. Thus, a meme is any idea, behavior or social artifact that can be transferred from one person to another by imitations; jokes, stories, tunes, fashions, urban legends, new sports and games, and art forms [Blackmore, 2000]. Among the elements that contribute to meme's effectiveness are sufficient simplicity to allow comprehension, perceived authenticity ('sounds like truth') and novelty but not obscurity. Perhaps, most importantly, it has to be perceived as 'useful'. It may be especially useful to apply the meme framework for assessing the elements, antecedents, and consequences of effective professional narratives, an issue touched on earlier in the paper. While memes have rarely been studied in the IS literature, recently scholars have begun utilizing the concept in their discussion of society-technology interface. For example, Kendall and Kendall [2005] describe and define evolutionary agents in the context of push technologies and explore how memes may influence these evolutionary agents.

Russian keyboard layouts. You can ask them in the middle of the night what key is between A and L and you'll hear surprised: "What do you mean - they are 7 keys apart?" 2) Big bosses will never fire a Russian programmer. They know that even working 10 hours a week and being half-drunk a Russian programmer will accomplish more than a Ph.D. both in the short and in the long run. [Note: Upon return to that site we suspected that this was a spyware site, so we do not reference it here].

[11] Kendall and Kendall [1984] in their research of North American medical administrators and directors developed STROBE, an instrument that uses a scale to assess physical characteristics of work environment. Part of the strength of this instrument is that it was developed on the basis of rich qualitative information obtained through interviews, yet it also provides a quantifiable, structured framework to process further data collected in the organization.

Fifth, while this article has focused on positive national narratives, this needs to be balanced by looking in greater depth at negative narratives. In this context, Kendall and Kendall's [2005] discussion of the social implications of meritorious versus malevolent memes exchanged by evolutionary agents may be of interest. Clearly, negative narratives are potentially offensive and politically sensitive and pose an extra difficulty in research. Negative narratives also pose greater difficulties in separating the external narrative from the internal one. Many of the negative stories are told by outsiders, and are either stereotypes or concocted as a competitive differentiation tactic.   .

 Sixth, there needs to be additional research on the right side of the research model (Figure 2). How do we know that national software narratives actually do influence outcomes, especially successes? Earlier, we argued that narratives have some role as a part of a nation's cultural capital, along with the more "objective" human capital indicators such as education. We also wrote earlier that myths motivated nations to sail across oceans, settle hostile lands, launch wars, and send men into outer space. Can we see an equivalent in software and show causality on the right-hand side of the model? One possible way to operationalize is to examine actual software task allocations, especially within large global technology firms that typically task out projects to various R&D centers in a menu of countries. How do narratives affect who gets what? The problem with such external operationalization is that narratives then get confounded with *stereotypes.*[12]

Seventh, while our focus was on narratives that nations tell themselves, outcomes are also influenced by outsiders' perception and treatment of these narratives. Indeed, this process can create new narratives, communicated by agents outside the reference group. Such narratives include stereotypes, hype, rumors, gossip, public relations, and national branding. These 'external' narratives, in turn, interact with the national software community's perceptions of itself, the motivations of the individuals within that community, as well the outcomes. Hence the interaction of the two — the internal and external -- is of interest.

There is rich terrain and stimulating research questions in the subject of narratives.

V. CONCLUSIONS

As expected, we found that national software narratives serve to accentuate differences along the lines of "We are better than they are."[13] In fact, it is no accident that in this exploratory study we

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[12] Narratives are different from stereotypes. Stereotypes are "beliefs about the characteristics, attributes, and behaviors of certain groups" [Hilton and von Hippel, 1996]. Like national narratives, stereotypes my be positive or negative. Like national narratives, stereotypes may be based largely on accurate representations, as well as, misleading representations. The key difference is that narratives are developed within the group while stereotypes are developed from outside the group. It is inevitable, as in any social system, that there are interactions between the beliefs of outsiders and the stories and self-identity of the insider. In order to limit our scope we do not address stereotypes in this article.

[13] Inventions and achievements seem to have many fathers around the world. For example, from the Soviet era, Russians believe that Cherepanov invented the world's first locomotive and Mozhajsky invented the first airplane [Snitkovsky, 1998]. The Irish take credit a bit more subtly. In an article in the Irish Times, we find: "the 1st person to split an atom was an Irishman. The largest telescope in the world for 70 years up to 1917 was designed and built and based in Ireland. An Irishwoman discovered pulsars in 1967 and an Irishman explained to the world why the sky is blue. " [Ahlstrom, 2005] In a book about Indian programmers [Sivakumar, 2004, p.120], the author who is himself a programmer, extols the scientific prowess of Indians throughout the centuries: the modern number system is rooted in India; Sanskrit is considered best for Natural Language Processing; an Indian game was the predecessor of chess; the first university in 700

chose six nations that are not only prominent in the software landscape, but also have strong nationalist fervor. We expect to find similarly interesting results when we study the programmers' narratives in Japan and China also nations with strong national fervor. In fact, five of the six nations chosen (the exception is Ireland) and the latter two are all nations which have a techno-nationalist orientation usually associated with the military. Conversely, we would be surprised to find strong national software narratives with relatively weak national identity and/or weak techno-nationalism.

We conclude by reiterating some of the benefits of studying narratives. Narratives assist in country branding. As Olins [2002] writes quite bluntly regarding country branding, the nation that makes itself the most attractive wins the prizes, others suffer. Furthermore, we believe that the study of narratives has some predictive uses since it informs us as to the resiliency of the software community. We speculate that richer and stronger narratives are more likely to be successful, in turn, spurring the national industry forward.

ACKNOWLEDGEMENTS

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> 1. these links existed as of the date of publication but are not guaranteed to be working thereafter.

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