No Hotel, Tent:
The International Children's Digital Library Goes to Mongolia

Ben Bederson
Human-Computer Interaction Lab
Computer Science Department
University of Maryland
www.cs.umd.edu/~bederson

Monday – June 19, 2006

I am sitting in a room with 35 people. We are launching the Mongolia READ project – Rural Education and Development, funded by a grant from the World Bank. The room is in a camp of 10 "gers" (similar to "yurts" found in other countries) an hour drive from Ulaan Baatar, the capital of Mongolia. The story of how I got here started several years ago.

The International Children's Digital Library (ICDL – www.childrenslibrary.org) is in Mongolia and it got here in Charlie's suitcase. I was supposed to take it in mine, but I got nervous. I was afraid that between U.S. export control laws and customs officers in Beijing (where we traveled through), the server we had installed ICDL on would be confiscated. So I asked Charlie Abelmann, the World Bank designer of the project to take it with him since he has some credentials that could be helpful, and he is much more experience traveling in this part of the world.

I arrived in camp here for the project kick-off meeting last night some time after midnight – after flying for 18 hours on 3 planes that took about 24 hours of real time and 36 hours of wall clock time – ending in a surreal fast midnight drive into the Mongolian mountains. It was somewhat unsettling because I had been expecting to go to a hotel in the city. But the driver that picked me up said "no hotel, tent" and proceeded to drive right through the city and he kept going, and going, and going – all without speaking another word. Although he did stop at a small market to buy soda, vodka and cigarettes.

We arrived after midnight in 50° weather to a camp of gers – round nomadic tents about 15 feet in diameter. I was led inside to a toasty wood-stove heated beautiful interior to see Charlie and Cristobal sound asleep, two of my colleagues from the World Bank. I was led to a bed in the dark. I lay down in the profound quite and exhaled. I continued to hear the buzz of jet engines and travel ringing in my ear – and the imagined images of the Mongolian countryside, which I had yet to see due to the dark as I drifted to sleep.

This unlikely collaboration between an academic computer scientist and this international development project actually makes complete sense. I am one of three leaders of the ICDL project, along with Allison Druin and Ann Weeks also at the University of Maryland. We have been building the ICDL for 4 years with as many years before that of work leading up to this project. The ICDL is a website of full scans of excellent children's books in 35 languages with a child friendly interface for searching and reading

online. It is now being spun out into the independent ICDL Foundation to support further growth. Independently, the World Bank has been designing a project to support literacy and education in rural Mongolia, concentrating on building libraries of excellent children's books throughout the country. They also decided to include a small digital component with the goal of exploring how interesting and educational material can be put on computers to motivate children and to push forward technological literacy and capability.

About 9 months ago, the World Bank called us. We shared experiences over several meetings and finally were able to figure out how we could create and deploy a Mongolian version of the ICDL as well as train Mongolians to scan books, enter metadata about the books, and use the library creatively in elementary classrooms. And the Mongolian books would also be added to the world-wide version that we would continue to host.

Deployment of the ICDL, naturally, is complicated. Not only is Mongolia's internet connection to the rest of the world slow, but there are limited connections at best throughout rural Mongolia. The idea is to start by setting up a primary server in the capital, Ulaan Baatar (which I hope to accomplish this trip). Then we will set up "satellite" servers in rural schools which get updated from the primary server through intermittent internet connectivity or manual updates with disks, airplanes, and IT staff. The server was actually purchased through an internal World Bank innovation grant written by Katie Nesmith that bootstrapped the process by enabling the ICDL to include older books. The larger project focuses on getting rural children access to the ICDL.

So, here I am at the kick-off meeting. There are 35 people from the government, the rural "aimags" (provinces), education specialists, NGOs, the World Bank, and me. Squeezed around tables at the edge of the room looking at PowerPoint presentations in Mongolian with a translator painstakingly and slowly translating from English to Mongolian (and occasionally the other way). Mongolian is unlike any language I have heard – except Inupiaq, the language of the Inupiat, the Alaskan Eskimos – a group I lived with for a year in 1986. They also look somewhat like each other – which isn't really that surprising in retrospect because the Inupiat walked over the Siberian land bridge about 10,000 years ago when more water was frozen and ocean levels were lower. And Mongolia is really just on the edge of Siberia.

Despite going to sleep well after midnight, I woke up at 5:30am. I restarted the fire to warm up the now freezing ger. Charlie was awake too, and so we went for a walk up the foothills surrounding the camp. With my first real view of Mongolia, I saw the remote beauty I had heard of. The pure and raw magnificence of the land defines awe. Gentle sloping hillsides covered with sparse grass and wildflowers headed up to the rugged mountainside. Horses, cows, and the occasional camel grazed in the distance as the sun came up over a ridge which all at once lit the land and warmed our faces. We walked for an hour as high as we could go until the ger camp was just white dots in the valley. At 2,000 meters without much sleep, my heart was pounding and my senses alive.

Breakfast was "tsai", cream of wheat, and a sandwich of liverwurst and coleslaw. The tsai was a tea I had never tasted – made with milk and salt, but no sugar. Revitalized, I was ready for a day of meetings in Mongolian with eagerness to learn more details about the broader project. When lunch came around, I learned that Mongolians really like to eat. I was full after a meat plate and steamed dumplings followed by rich beef and vegetable soup. And then lunch came – a huge plate of steamed lamb dumplings and fried breaded beef patties. We joked about the high quality beef which was hormone-free, antibiotic-free, free range, natural grass fed – as is all meat here.

I gave my talk about ICDL in the afternoon, including a demo of the Mongolian version (running off my laptop). The disruption of translation made it hard to stay in the flow, but it seemed to go well. The digital library is a very small part of the larger project which focuses on improving rural literacy with a 3-pronged approach:

- Select and deliver 4 copies each of 40 books to each of grades 1-5 in all 385 rural schools. These schools have essentially no children's picture books that aren't traditional textbooks.
- Train teachers in creatively and effectively using the books to teach with as a condition of receiving them.
- Design and implement a country-wide standardized test of students to track educational achievement.

The schools being targeted have a dropout rate of about 60% by 5th grade, compared to near 0% in the capital. So while the goals may appear basic, they are in fact of fundamental importance.

They also bring to light the challenges of deploying a digital library. Yet there is real interest in pushing forward technological solutions alongside the traditional. The audience included 2 aimag governors, and several governor aides. There were a number of questions and discussion about the ICDL. Perhaps the most interesting of which was to ask if we had songs in the ICDL since children universally love to sing. I sadly had to say no – but it is a great idea.

When it was finally acceptable to go to bed (around 9pm), I was beyond ready. Deeply asleep seconds after lying down, I was more than a little disturbed to be awoken at 11pm by loud disco music. Thinking it was perhaps the camp staff, I got up to ask them to turn the music off. But I found instead nearly the entire camp dancing and drinking in an energetic party. My point of view that 5 people traveling clear across the world to help this country who needed some sleep was clearly going to have no influence there – so I went back to bed and listened to the beating music in bed waiting impatiently for the revelers to tire. It turns out that the youngest World Bankers (Katie & Cristobal) joined the dancers, but us older ones (including Charlie and Carol) just waited for quiet.

Tuesday – June 20, 2006

A good sleep (after the music ended) brought this day into focus with a smile. Perfect weather with a crystal clear blue sky, bright sun, and time before breakfast brought me to my feet – and I went on a beautiful hour hike up one of the ridges that led to innumerable

wild flowers and unsurpassed views of the Mongolian countryside with valleys and low mountains as far as I could see.

Today's meetings were about the "implementation" of the project. The distinction between the design and implementation phases of World Bank grants is important. The Bank works with the recipient country to design the project which in this case involved 1.5 years of meeting with stakeholders throughout the country and building on several earlier years of economic analysis and study. The grant of US$4 million was then given to the country which implements the project. While the bank still supervises the project and will provide advice, the country is responsible for making the project happen. This means that the ICDL contract is with the Government of Mongolia, not the World Bank. This contracting process was not easy as neither I nor the University of Maryland nor the Government of Mongolia had any experience with this sort of contract. Given that the implementation phase has begun, today's talks about the project implementation were largely given by the local staff (education consultant, procurement and financial management analysts) of the World Bank office in Mongolian without translation. So for hours on end, I dutifully listened to the impenetrable, but beautiful sounds of Mongolian wash over me. This, it seems, is what it takes to create such an ambitious and complex project.

The day alternated between PowerPoint presentations in the one room used for work, meals and dancing – and tea breaks outside. This morning, I watched the waitress galloping across the fields on a small Mongolian horse. As I enjoyed the romantic beauty of this image, I watched in horror as she lost her balance. At that moment, she rode behind a ger, but didn't come past the other side. I ran around the ger to find her lying on her back not moving. Many people ran to her help, and she was taken to the city by one of our drivers for medical care. She came back later in the day with an apparent rib and leg injury – and looked pretty miserable, but at least was walking. With a bit of shock, we continued our meetings among concerned whispers.

We finally finished the project launch meeting and went to visit a rural school on the way back to the city. The school was relatively well-off, being within an hour's drive to the capital, but I'm afraid that wasn't saying much. It served 350 students in 1st through 11th grade (there was a separate kindergarten) that came from the surrounding "bagh" (small town) of maybe a couple thousand people. The town had a very modest economy consisting nearly entirely of government jobs, herding animals, and a few small shops. There were houses and gers surrounded by a make-shift non-continuous wooden wall – with a surprising block of apartment buildings eerily reminiscent of the ones that make up Petropavlovsk, Kazakhstan (where my wife & I adopted our children from). It turns out that this was an abandoned Soviet military camp – which also explains the bizarre old fighter jet on a pedestal.

The 3-story concrete school, which was closed for the summer and under some renovation, was being painted. With closed windows, the smell was painful. Each floor had a long hallway with small rooms to the sides. All were in pretty rough condition. There were 4 people working there at the time who were very gracious and showed us

around. We saw a few rooms of interest. A science storage room had a shelf with some chemicals, a plastic body demonstrating human musculature, and a closet of books in no apparent organization. The small library we saw had 2 walls of books, packed double deep. We were told that there was no catalog, but there was a librarian and books were available for loan outside the school. The books seemed to be mostly textbooks with no apparent fiction and no children's picture books at all. There was one big red obvious book labeled "Karl Marx" (in Cyrillic).

A computer room consisted of 5 Pentium III computers that were donated 5 years earlier by a political candidate. They were disconnected for the summer, but we were told that they ran "Windows" and were used to teach IT. When asked for more detail, they said this consisted primarily of how to use Microsoft Office. However, there was no network or CD drives, and the printer was broken, leaving me to wonder how much could be done with these computers. There was one working printer in the school attached to the one other computer which was in the school head's office. We asked if children were allowed to use the computers on their own after school and we were told that they were, but none ever do.

Wow – just what challenge awaits us to deploy the ICDL? The school has a budget of roughly US$2 per child per year for supplies – and this school is better off than most. The project calls to deliver 25 computers with a local ICDL server and network to each of 5 schools. I'm glad we have some time to figure this out!

Finally, we made it back to the city and hotel where I was able to take a shower for the first time since leaving the U.S. Then we had planning meetings at the World Bank office here in Ulaan Baatar until 8:30pm before dinner. I managed to sleep about 6 hours before waking at my customary 5am. This development work is not easy.

Wednesday – June 21, 2006

This day represented the transition from the excitement of a new project to the reality of working with fragile technology in a difficult situation. The morning was very interesting. I had two meetings set up with local technologists that we thought might be able to help the project. Because the Bank is not allowed to be directly involved in the implementation of the project, we thought it best if they not join me – and no one from the Ministry of Education was available, so I went myself with the driver taking me around town.

The first meeting was with Mr. Sukhbaatar Enkhjargal, the Executive Director of an NGO (non-governmental organization) called MIDAS (www.ict.mn/midas). The meeting was in the "IT Park Building", which turned out to be a building downtown with many small technology-related companies. The dark run-down corridor led to a locked MIDAS office, so I waited about 15 minutes until the rushing and out-of-breath Mr. Enkhjargal showed up. His office was a jumble of papers, brochures and boxes and boxes of software and CDs. We sat down to talk and he told me about his organization and projects as his intern brought us hot tea (which apparently happens at any meeting of length).

Mr. Enkhjargal studied IT in Irkutsk, Russia and then education in Australia. He clearly has a passionate interest in combining these two interests and told me about two projects he is in the middle of, funded by the Asian Development Bank. The first was to develop educational software that could be distributed to schools around the country so they would have some meaningful thing to do with the computers that are slowly being purchased. He contracted with companies to develop 15 titles on CD which he proudly showed me. Two were for elementary education including one animated alphabet program with pictures of letters, and associated objects, their pictures and sounds. Twelve were for secondary schools and focused on teaching science, language and math. Some of those were interactive game-style custom programs, and some were PowerPoint content. Finally, the most effort clearly went into a Mongolian spell checker plug-in to Microsoft Word and PageMaker. I learned that there is no Mongolian version of Windows, so they use the American version and just use a Cyrillic character set. They have a saying that "Mongolia is the end of fashion" – meaning all world-wide activities get to Mongolia last. This came up several times during the day as they were very proud that the ICDL was getting a custom deployment there first. These 15 CDs were duplicated and were being given to each of the ~850 schools in the country.

The second project was to explore the use of technology in the rural "soum" schools. They gave a modern laptop (Dell D505 Latitude) with an extra battery and an LCD projector to each of 37 schools with the goal that the teacher would be able to use those 15 CDs to lead classroom activities. He also gave some laptops to dorms with groups of 6-10 children so they could use the machines directly. He said it was going well, but I did not hear much specific description about how they were used. I asked about security issues, and he said it was not a major problem because the schools were so rural with only 1 or 2 cars passing through a day that there a close awareness of who did what. He said that one laptop was stolen, but that it was quickly recovered.

I then met with Mr. D. Enkhbold, the head of the Information Technology Department at Khan Bank (www.khanbank.com), the largest and best networked bank in the country. This building was much nicer, and had a beautiful exhibit of Mongolian art throughout the lobby and hallways. I happened to meet Mr. Enkhbold in the lobby, and he ran up the 5 flights of stairs as I struggled to keep up. His office had a beautiful huge map of Mongolia with push pins throughout the country. There were 134 red pins for branches that were connected by a private network to the main branch, and what looked like an equal number of green pins that were not connected at all. He proudly told me how they used a range of technologies and companies to get connections through these incredibly remote areas. Mongolia is about 1,000 miles across of very undeveloped mountainous and desert lands. As a social service, they have begun starting to make their network available for local use. They set up internet cafes in government buildings at two sites, and provided a network to one rural school and one city school – all available only after bank hours. Even so, security and bandwidth management remain primary concerns. The ICDL has a significant problem of how to update the remote satellite servers once they are deployed, and I came to this meeting hoping to convince them to allow us to use their

network for this purpose. He clearly warmed to a demo of the library that I have running on my laptop, and by the end of the meeting was definitely willing to consider it.

The last two meetings were with local ISPs to help the Ministry decide which company to contract with to provide hosting and maintenance services for the ICDL server I brought with me. Both companies were quite modern and appeared to have sufficient technological experience and capability to make this work, so we can safely make the decision based just on price.

With the confidence of a successful day and growing understanding of what it will take to make this project work, I met Charlie's request of us checking the ICDL server with naïve optimism. But I bowed to his caution and started it up to find to my horror and quickly growing panic that it wouldn't boot, and the disks were apparently fairly badly damaged in transit. This led to a late-night session with a friend of Saruul, the ever-friendly self-taught bank IT person in heels. Her friend conveniently worked at a major ISP. He had a matching Dell PowerEdge server, and so with a fair amount of trouble, we found that while the machine wouldn't boot, the data seemed to be ok, and we were able to back up the disk. With no dinner and growing concern, I went to bed around midnight this time sleeping all the way to 5:30am with a long day ahead of me.

Thursday – June 22, 2006

What does it take to fix a server that won't boot while traveling in Mongolia? About 24 hours of focused attention, a friendly local IT person with knowledgeable friends willing to help, a good web connection, advise from your IT staff back home, a three hour call to the U.S. to the person that set up the machine, and a pinch of good luck. Fortunately, that's exactly what I had – and at 1:00 am this morning, the Mongolian ICDL server was good to go. It was a pretty painful process because while I'm an experienced developer and know all about the architecture of our software running on the machine, I haven't done any Linux configuration in about eight years, and I've never touched a RAID disk setup.

I spent the first big chunk of time trying to recover the disks and setup – learning about the redundant disk configuration (RAID) as I went. The point of this setup is to help in exactly this situation – when a disk goes bad. But it appears that there was something wrong with the RAID configuration itself in addition to some disk trouble. So after the data was backed up safely and I gave up on restoring the setup, I decided to start from scratch.

With CDs for Enterprise Red Hat Linux 4 and a subscription to Red Hat's service in hand, I took a big gulp and formatted the disk. I disabled the RAID setup and returned to a regular one disk setup with the disk that seemed to be good (although not bootable). I kept the partition layout leaving the data partition alone so I could avoid transferring the data from the backup disk – and learned how to install Linux. Fortunately, Red Hat has come a long way since I last tried this, and the process was relatively smooth – and most importantly, I had no disk trouble.

Our software configuration gave me a fair bit of trouble because I couldn't use all the software that Red Hat distributes since we needed specific versions of some things. So I had a fair bit of fighting to do to avoid conflicts between the way we needed Apache, Tomcat and Mysql set up and the way Red Hat does it. But in the end, with heroic long-distance help from Anne Rose back in Maryland on the phone – while she would try commands on our staging server before I executed them (reminiscent of Apollo 13) – we got everything enabled, and auto-starting on boot. This last step was crucial since while the IT staff in Mongolia can keep the hardware running and the operating system patched, we can't rely on them to know anything about our software and where to nudge it when it falls over. Finally it was over, and I collapsed with a big smile on my face – happy as a clam when I found myself sleeping all the way until 7:00 am.

Friday – June 23, 2006

One last hurdle remained before I could actually install the server, and that was a contract with the ISP, MobiCom. With this being my last day in Mongolia, and knowing how difficult it would be to get the server installed once I left, I was feeling pretty anxious. Then I heard from the MobiCom engineer we had been talking to that despite our requests, and them having the server as collateral, they were not willing to install the server without a signed contract. But the contract still had a few rounds of negotiation to go through, and that seemed unlikely to happen in one day. So with resignation settling in, I was delighted to get a call from Khishi (the Ministry coordinator of the project) who said that she had negotiated with MobiCom to let me install the server whenever I was ready!

First, though, I was scheduled to make a presentation at the Open Society Forum, an intriguing local foundation funded by George Soros. The Forum (www.soros.org.mn) has a goal of promoting openness in Mongolian society, government and policy decisions. With significant corruption in Mongolia, there are strong efforts from the Forum, the World Bank and other organizations to shift the culture to openness and transparency to discourage the graft. They were having a set of talks and invited me to discuss ICDL. I found an audience of about 50 people who were academics, researchers and librarians with the day's focus on information access. I always find translated talks difficult with the rhythm of communication being constantly broken, but it went well, and I think the audience was interested. I then met with the executive director of the forum, and found a willing partner in possible future ICDL work.

Finally it was time to install the server. We picked up Bayanzul, the network engineer at MobiCom and drove to their server center. MobiCom is a major communications company in Mongolia offering one of the two main cell phone services along with internet access and hosting. So their server room was the cell phone hub as well as regular computer hub making it a big, noisy and interesting room. I was hoping this would be a pretty straightforward operation, but with technology, there's always something. In this case, it was physically installing the server in the rack. They had built their rack one notch too short and the rails that the server slides into wouldn't fit. Reconfiguring the rack was out of the question since it was loaded with other equipment. So after much experimentation, including considering cutting the rails we brought with a

hack saw to make them fit, we found a simpler solution. There was an unused platform in another rack that we were able to remove and install in the rack we were using and give up on the rails. Bayanzul was the second female network engineer IT person I met in Mongolia which makes two more than I've ever met before.

Once the server was in place, we plugged in power, a network cable, and a temporary monitor, keyboard and mouse for testing, powered it on and … it worked! Our software (relying on Apache, Tomcat, and Mysql services) all started up smoothly, and with a few configuration tweaks, we were done. We removed the monitor, keyboard and mouse, attached the faceplate over the server, took a picture, and closed the door. Once the contract is signed and the domain name is in place, the first ICDL mirror anywhere will be ready for the public at www.read.mn. With my major technical goals of the trip accomplished, I could finally relax and enjoy the last meeting of the trip.

I went to the Children's Book Palace, the national library of children's books along with Katie and Tsogo from the World Bank. We met with the executive director, Oyunbileg and Sukhbaatar, the IT guy there who has been scanning Mongolian books and entering metadata for the ICDL. They've already completed 23 books and have another 30 in progress, so we've greatly appreciated their efforts over the past months and I was eager to see the library and meet them.

The Children's Book Palace was in a fairly ordinary building, occupying the 2nd and 3rd floor. It didn't feel so much like a library as a government building with some book rooms. But still, it was quite pleasant. We first saw the children's reading room which was comfortable, and had books in nice low shelves that displayed the fronts of the books. But there weren't that many books, many were old, and some looked like textbooks. There was one child there, and she was playing with the legos on the floor. The librarian was sitting at her desk listening to fairly loud music which I didn't find too conducive to reading. We also saw some adult reading rooms which were simple, but had plenty of nice big flat tables for working, and notably were quiet. We then saw the closed stacks which were cataloged and reasonably well organized. We went over again the process of adding new books to the collection, and promised to translate the metadata entry form.

And with that, my work was over. The challenges of deploying complex technology in developing areas are significant. But the need is real and there are many organizations eager to help. Despite limited infrastructure, local knowledge about IT is growing with competence in Windows and Linux (although I didn't see a single Macintosh). I've started down a path that is challenging, but extremely rewarding – and fun. I'm looking forward to coming back for the next steps.

That ends my week in Mongolia.   The ICDL has expanded its reach, and continues the journey to bring excellent books to the world's children.