Science, Technology and Engineering Capacity Building in Iraq

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Summary Report

INTRODUCTION

The efforts we are undertaking in Iraq are not aimed at *building* science, technology and engineering capacity, but at *rebuilding* it. Civilization in Iraq began over 5000 years ago with the settling of Mesopotamia between the Tigris and Euphrates rivers. The Sumerian people that settled in southern Mesopotamia were technological pioneers and innovators, developing such technologies as the wheel, irrigation, astronomy, and the first alphabet. Literature, the first code of law and organized government were developed in the region 4000 years ago. The Iraqi people have a proud, rich history of science, technology and engineering that spans not just centuries, but millennia. This tradition has been carried on through the modern era. In the early 1980s Iraq won a UNESCO prize for eradicating illiteracy with a strong education system, both for men *and* women. Iraqi engineers and scientists worked and trained with their colleagues worldwide. Unfortunately, during the Hussein era, innovative freedom and expression were repressed, and much of the infrastructure fell into disrepair as necessary resources were mismanaged. The Iraqi science, technology and engineering communities have lost 20 years, but they are eager and ready to resume their place as pioneers and innovators.

Rebuilding science, technology and engineering (STE) capacity in Iraq is therefore an essential component of the current reconstruction effort. It should not be considered a secondary requirement, but a top priority. Contracts and awards should be structured in a manner that ensures the building of indigenous capacity to follow through with projects long after the termination of the contracts.

The first step in addressing the issue in Iraq is to understand what capacity building entails. Lt. General (R) Hank Hatch defines capacity building as "*the building of human, institutional and infrastructure capacity to help societies develop secure, stable and sustainable economies, governments and other institutions through mentoring, training, education, physical projects, the infusion of financial and other resources, and most importantly, the motivation and inspiration of people to improve their lives.*" Successful STE capacity building requires a system-wide approach. Programs must focus on K-12 education, higher education, basic and applied research**,** social and governmental interactions with the scientific community, and private enterprise. Links to the global community must be forged to provide access to the international marketplace of ideas and to facilitate the standardization of practices and procedures.

Building this STE capacity in Iraq is critical to fostering and sustaining political reform and economic development. Concrete infrastructure investment is useless in the long run if nobody can maintain it. The more rapidly the Coalition

spends on infrastructure, the less the Iraqi people "buy in" to the system. It is preferable to let the Iraqi people do as much of their own reconstruction as possible. It may not be perfect, but it will be theirs – they will maintain it and budget for it in the future. This concern for engaging Iraqis in the reconstruction effort is essential in every step of the operation. Activities must be undertaken *in* Iraq, *by* Iraqis, and address the *needs of* Iraqis, for the Iraqi people to have confidence in the outcome and a sense of proprietorship for the activity.

TRANSITIONAL LOGISTICS

The transition of authority to the Iraqi people will occur on June 30, 2004. On July 1st, the US will open its largest embassy in Baghdad. After that point, it is very possible that any structure that was created without complete transparency to, and cooperation with, the Iraqi Governing Council will be dissolved, and then possibly reorganized in a form more appropriate to the new, sovereign Iraqi government.

The Program Management Office (PMO) is accountable for construction projects. This office will report to the Coalition Provisional Authority through its dissolution on June 30, 2004, and will then continue operations under a reconstituted name under the authority of the U.S. Department of Defense. The PMO has a large presence, with offices in nearly all, if not all, 18 governances. The operational model is similar to that of the provincial reconstruction teams in Afghanistan. It is very important to have an extended presence to see what is actually going on and to receive feedback from the communities involved.

The Army Corps of Engineers has established a Gulf Regional Division in Baghdad and three district offices in Iraq to support the PMO and to manage military construction. The office will provide an enduring and efficient base of support to both U.S. and Coalition operations in Iraq and will work hand in hand with the Iraqi people, their government and the U.S. Embassy. Staff will be a mix of U.S. citizens and local Iraqi engineers, so that the supportive relationships can develop to the benefit of both nations and their engineering communities.

Security continues to be the most difficult obstacle to the reconstruction effort. Security must be coordinated with all programs and projects. Pervasive awareness of the problem exists, however no quick fix solution will be available. The current state of security in Iraq makes it very difficult to bring teachers, scientists, engineers**,** aid workers and many other civilian personnel to Iraq to assist in building capacity within Iraq and facilitating the reconstruction effort. Security also complicates operations for the personnel on the ground and logistical difficulties hobble their efforts further. There is a massive Department of Defense effort underway to help improve the security situation, including the formation and training of security services such as the police force and the Iraqi army.

STATUS OF FUNDING FOR RECONSTRUCTION

The U.S. has pledged $18.4B (down from an initial $22B) for reconstruction and humanitarian assistance. Of that, $14B has been or will be awarded soon, while the remaining $4.4B is being reserved for the new Iraqi government. On October 23-24, 2003, at the invitation of the Government of Spain and on behalf of the European Union, Japan, the United Arab Emirates and the U.S., the donor community met in Madrid to raise funds for Iraqi reconstruction. The Madrid Donor conference tallied over $32B in official assistance with top contributions by the U.S. at $18.4B, Japan at $5B, the World Bank at $3B to $5B, the IMF at $2.5 to $4.25B, the EU at $1.6B,

UK at $0.45 B, Italy at $0.23, South Korea at $0.2B and Canada at $0.18B.

The UN Security Council Resolution 1483 (May 22, 2003) called for the international financial institutions to assist the people of Iraq in reconstruction and to facilitate assistance by the broader donor community. On June 24, 2003, the UN hosted a meeting of some 50 states that collectively became known as the Liaison Group. The Liaison Group in turn requested a small number of major donors, known as the Core Group, to convene a Donors' Conference. The Liaison Group also asked the World Bank and the UN to assess Iraq's needs, and to design a multi-donor trust fund to coalesce donor support around Iraq's priority reconstruction needs.

As a result of the Liaison Group request, the World Bank and the UN carried out a Needs Assessment that identified the priority reconstruction needs, and designed a multi-donor trust fund. The Needs Assessment divided the reconstruction effort into three phases: immediate (6-9 months), medium term (1-2 years), and long term.

As background, the World Bank made its last loan to Iraq in 1973 and sent its last supervision team to Iraq in 1977. The Bank had no further dealings with Iraq until last summer. Iraq currently owes the World Bank approximately $100M.

The multi-donor trust fund is called the International Reconstruction Fund Facility for Iraq (IRFFI). It comprises two separate trust funds: the World Bank Iraq Trust Fund and the UNDG Iraq Trust Fund. Close coordination between the two trust funds is achieved through a joint donor committee that provides oversight, offers strategic guidance and reviews progress. There are about 20 donors that are participating in the oversight committee. The IRFFI will continue until December 2007 or until the funds are fully disbursed.

From the Iraqi side, donor coordination is headed by the Iraqi Strategic Review Board (ISRB), which is chaired by the Ministry of Planning and Development Cooperation. Proposals for consideration for IRFFI financing need to be within the priority reconstruction program of Iraq and must be endorsed by the ISRB. Endorsed proposals are in turn reviewed by the IRFFI for funding consideration. Approved proposals are processed into projects by the Bank and the Iraqi implementing agencies, which in most cases are the recipients of the funds. Recipients include Iraqi ministries, governates and municipalities, other public sector, international financial institutions, NGO's and the private sector. World Bank Iraq Trust Fund financed projects are being processed under emergency procedures with a simplified design and a shortened preparation time. Since there is no Bank presence in Iraq at this time due to security considerations, an independent firm will be selected as a monitoring agent to support the Bank in its review and monitoring of procurement, financial management, safeguards and overall project implementation.

Of the $32B pledged at the Madrid Donors Conference for Iraqi reconstruction, approximately $1B has been committed to IRFFI, with $400 million to the World Bank and $600 million to the UNDG.

In addition to donor funds under the World Bank Iraq Trust Fund, which will be provided as grants, the World Bank anticipates lending between $3B and $5B to assist Iraqi reconstruction. For Bank lending to begin, certain threshold conditions must be met. These conditions include international recognition of the Iraqi government, effective government control with a reasonable degree of stability and

public acceptance, and an assessment of whether the new lending would expose the Bank to additional legal or political risks associated with the country's financial obligations.

The World Bank has developed a strategy for the interim period until it begins lending to Iraq. The interim strategy focuses on building institutional capacity, addressing urgent needs and laying the groundwork for development of the medium-term strategy. The urgent needs include jobs, basic infrastructure and a jumpstart of economic activity. Institutional capacity building will include providing support and training to the Iraqi ministries and the private sector in international project management (procurement and financial management practices) so they will be equipped to deal with international assistance, and sector-specific training to help build the foundation for a legal and regulatory framework and sectoral reforms. Development of an outward-oriented private sector is an essential element in Iraqi reconstruction. In addition to having the appropriate legal and regulatory framework in place, Iraq must develop its STE capacity, including standards and practices. The necessary groundwork for medium-term efficacy includes establishing financial institutions and resolving certain institutional issues that support a transition to a market economy by providing appropriate safety nets for a vulnerable population during the transition period. No higher education projects are being funded under the interim strategy, but are anticipated to receive funding under the medium-term strategy. However, World Bank higher education specialists are currently in dialogue with the Minister of Higher Education, to develop capacity building training programs in the immediate future.

CAPACITY BUILDING IN EDUCATION

Currently the Iraqi people are 20 to 25 years behind in STE capacity. Currently, the degrees granted by Iraqi institutions, particularly in engineering, do not meet international standards. The qualified and experienced Iraqi STE community is over the age of 45. This group received graduate education largely in the US or UK. The average age in Iraq is currently 19 years old, leaving a vast gap in STE capacity.

The primary capacity building efforts to this time have been at the K-12 level due to humanitarian planning that took place prior to the end of the war. These efforts include the provision of textbooks, basic teacher packages and materials, and school repairs. However, the Iraqi Ministry of Higher Education did manage to successfully operate the University and Technical School system while at the same time undertaking a de-Baathification process and subsequent selection of new senior faculty. The recent re-establishment of the Iraqi Fulbright program will also help to develop the Iraqi STE capacity.

When USAID began working on rebuilding Iraqi education, there was no ministry in place to govern education, and all records were destroyed – some think deliberately. USAID knew that the primary schools had to open quickly and that the children would need to be tested. They arranged with UNICEF to provide testing. The schools opened on time, equipped and furnished. UNESCO, with USAID funding printed and distributed over 8 million propaganda-free Math and Science books nationwide. UNICEF, with Oil for Food funding printed all of the other subjects. Teachers' pay increased approximately 20 fold and nearly 34,000 teachers have received training. To date, about 2700 schools have been rehabilitated. Parent teacher associations were formed to help

rehabilitate the schools. Currently there are more children in primary school than there were immediately prior to the war.

Much less progress has been made with higher education. Preliminary priorities focused on primary and secondary education. Recently, USAID has begun to fund higher education after evaluating applicants culled by a request for proposals sent out to Universities last year. Among the applications were many outstanding proposals deemed worthy of funding. Grants to five groups of Universities have been awarded so far, totaling approximately $20.7M. Subject to availability of funds, additional grants may be awarded in the future. These programs link US Universities and University consortia with Iraqi Universities and focus on improving specific aspects of their program, such as agriculture, archaeology or law. No projects directly targeting engineering capacity were awarded in the first round of funding.

There are 22 universities in Iraq, of which 19 have STE curriculum. In addition there are 50 technical education institutes. Baghdad University is the largest and the oldest of the Iraqi universities with approximately 70,000 students (20,000 graduate students). The main campus suffered only minor damage and experienced very little looting due to early security measures. The school of pharmacy was, however, looted badly. Throughout Iraq, the STE resources are in disrepair and antiquated. Labs are poor; there are no parts or tools and no new construction within the last 6 years. The equipment that does exist has been poorly maintained. The library has had no new journals for the last 15 to 20 years. Computers were scarce and in poor working order due to the effect of the sanctions in the 1990s. Immediate needs identified by the engineering faculty of the university include equipment, internet access, journals, periodicals, textbooks and the establishment of professional societies. At this time there is no budget beyond faculty salaries to provide for repairs and additional equipment.

However, the US engineering community, through the American Association of Engineering Societies (AAES) and direct activities by such organizations as the American Society of Civil Engineers (ASCE) and the Society of Women Engineers (SWE), has begun to engage Iraqi engineers in an effort to build capacity and to establish Iraqi chapters. The ASCE has made its publication and databases available to Iraqi engineers to help bring them up to speed on standards and practices. On Dec. 2, 2003, the ASCE held a web seminar for more than 110 Iraqi engineers at Baghdad University. Four more similar events are planned.

There have been other notable accomplishments in rebuilding higher education in recent months. Several Iraqi universities have signed MOUs with 10 British, 4 French and 2 South Korean universities. Faculty exchange programs will bring 13 faculty to Harvard and 12 to West Point.

Short-term goals must also include addressing the population of stranded graduate students in Iraq. These students have finished their coursework but require access to laboratory and research facilities to finish their degrees. Establishing institutional partnerships between US and Iraqi Universities and professional societies will help to provide long-term stability and growth of the Iraqi STE community. Mentorship will play an important role in the education, research, and capacity-building process, but a State Department proposal, “Science, Technology, Engineering Mentorship Initiative for Iraq” to establish an international peer-review research grant program has not yet been funded. Additionally, grant and aid programs leveraging these partnerships would further stimulate STE

activity at Universities and Technical Institutes. Currently, programs must focus on bringing Iraqi scientists and engineers to US Institutions due to security concerns, but providing visiting faculty to Iraq will be a long-term goal.

Long term STE development also requires adopting best practices, standards and accreditation – both in engineering education and throughout the newly developing Iraqi infrastructure. This is essential not only for the developing STE capacity, but also for improving investor confidence and consequently the Iraqi economy. Re-establishing Iraqi professional societies will help to solidify these ideas and embed them into the society.

Information technology and communication infrastructure is critical for rapid development, education and training. It is also at the core of modern STE and will be vital for building and sustaining the STE community, as well as driving the developing economy.

The sense among the University faculty is that the immediate and long-term needs are known and that, although there have been many meetings to discuss these needs, nothing tangible has materialized to meet them. To succeed in rebuilding the STE community, STE must be linked to national interests and provide tangible results. International standards and accreditation will be important to the long-term success of the STE community.

REDIRECTION OF WMD PERSONNEL

One of the highest priorities for short-term capacity building efforts by the U.S. government has been the redirection of former weapons of mass destruction (WMD) personnel. While the physical aspects of a WMD program are easy to remove, the human and intellectual capacity is much more difficult to manage. WMD knowledge cannot simply be turned off. Therefore, programs and policies must be implemented that will continue to challenge and stimulate the former WMD community while focusing and maintaining their efforts on peaceful and productive endeavors. The U.S. State Department and the Coalition Provisional Authority have approved 2 such programs.

The first program, already underway, is a $2M quick start project center that will support the operation of projects by former WMD personnel. The Iraq International Center for Science and Industry will officially open in May 2004. The second program will develop long-term projects and emphasize commercialization and public/private partnerships. Projects are currently focused on utilizing the WMD personnel to address national and regional reconstruction efforts. The objectives of the WMD personnel redirection programs are to diminish the proliferation threat, assist in transitioning Iraq to a market economy, assist the reconstruction effort by focusing indigenous talent in a constructive manner, and reintegrate the Iraqi STE community into the world community.

ENGAGING BUSINESS

The business community has been floundering in its efforts to engage Iraq with the exception of a few large corporations that are either involved in the reconstruction process or meet a well-identified need, such as oilfield service companies. The mainstream business community involvement that will be required to develop a sustainable market economy is struggling to find traction. Five to ten years may pass before Iraq achieves a true market economy. Achieving such an economy will require the business community to engage Iraq enthusiastically. Iraq will rely on the U.S. government, development banks, the Iraqi trust funds and donor funds, and oil/gas revenues to help stimulate the economy and encourage

development of the marketplace. If successful, Iraq has the potential to serve as the global economic portal to the Middle East.

U.S. businesses remain cautious due to the current level of risk inherent in Iraqi investment. This risk involves both the financial and physical security of assets and personnel. The current provisional government provides no guarantees for future contract enforcement, making investors hesitant to make agreements prior to the transition of power and establishment of a legitimate central Iraqi authority. Additionally, the players that are in power and active now will change with the transition. Investors and businesses want to see the shape and form of the new government and who the players will be before taking any action. As a result of the uncertainty in these factors, predicting the efficacy of the marketplace is incredibly difficult.

Additionally, the Iraqi national debt is worrisome to investors. Debt restructuring has not yet occurred. It is estimated that Iraq has a national debt of $116B. Approximately $42B of that amount is owed to the Paris Club and $46B to other Middle Eastern countries. Beyond the debt, there are other pending contracts such as obligations to Russia worth up to $52B. As a consequence, investors will remain cautious with regard to Iraq until they see generation of non-oil revenue.

Business and investment in Iraq will also rely on aid through other financial resources. The U.S. Export-Import Bank will help to support the trade bank of Iraq, provide credit insurance and provide working capital guarantees for sub-contractors. The U.S. Overseas Private Investment Corp (OPIC) will act as a small business financing facility and will also provide support to the Iraqi trade bank. The U.S. Trade Development Agency is also supporting railway reconstruction efforts.

Currently, non-U.S. countries are being more aggressive in investing in Iraq. Local and regional actors understand the community and business ethic better than U.S. companies and are having an easier time with business development. U.S. companies will benefit from employing Iraqis as their local workforce, or at least individuals from the region.

Money for small projects is still difficult to acquire. Small businesses, startup companies and small, distributed projects are not addressable by current reconstruction grant and aid programs. Programs and policies must be implemented that are capable of reaching down to these smaller endeavors to build broader capacity.

For an economic marketplace to be viable, sound financial institutions and a defined system of property must be established. Lending, including personal and small business loans, will be required to engage the broader community.

CONCLUSIONS

Four critical elements are prerequisites to successfully continuing and expanding STE collaboration with Iraqi counterparts:

- *security* on the ground
- *sovereignty* for Iraq after July 1
- *stability* in the provisional Iraqi government
- *sustainable* political and economic conditions

These “four Ses” are in great flux, but collaborative STE capacity-building efforts must continue before July 1st and thereafter, with the expectation that the U.S. Administration is resolved to staying the course and ensuring a successful transition to a free and more democratic Iraq. To preserve the momentum established by the STE community to date,

however, additional strategic, funding and institutional actions must be taken.

Strategic - STE cooperation and capacity-building, broadly defined, must become a core element of our efforts to help Iraq transition to a more democratic society and this message must be reinforced within the Bush Administration and on Capital Hill. A modern and comprehensive definition of capacity-building should also be promoted as an integral part of this lobbying effort and as a core precept of sustainable development in the 21st century.

Funding - STE and related comprehensive capacity-building must be included in strategic plans for, and as funding "line items" within, international development and lending institutions. In that context, the assistance of international lending institutions and development assistant organizations -- such as the World Bank, the Iraq Trust Fund, the UN Development Group Development Fund for Iraq, and the Agency for International Development -- must be enlisted to institutionalize such activities into the current phase of reconstruction, if possible, and, without fail, into the medium and long-term programs for Iraq. Apart from supporting core education requirements -- curriculum development, textbooks, and student and faculty mentorship -- themes and priorities within STE capacity-building should include reconstruction and/or building of new libraries and research laboratories, establishment of a generous basic and applied research grant program, and facilitation of professional contacts between Iraqi STE personnel and students and their US and western counterparts.

Institutional - Ongoing STE capacity-building activities of the American higher education and professional societies must be strengthened and supported by the National Academies of Science and Engineering and the Institute of Medicine, non-profit organizations such as the Civilian Research and Development Foundation, and international organizations such as UNESCO. Public/private partnerships -- and particularly the advocacy and support of the business community -- will be indispensable to success, particularly when Iraqi infrastructure is substantially restored and expanded and STE human and institutional capacity (including former WMD personnel) is stabilized and redirected to gainful employment and critical needs in the new Iraqi economy. In this context, and looking toward the medium to long-terms, the business community should be enlisted to seek support and foster partnerships for the STE initiative with a variety of its members and other stakeholders, including the US Chamber of Commerce, the Export-Import Bank, the Trade and Development Administration, and the Overseas Private Investment Corporation.

The State Department, and particularly the Office of the Science and Technology Adviser, will continue to serve as a general coordinator for the STE capacity-building process for Iraq. Of particular importance in the near term is the establishment of a Counselor and office for Science, Technology, Engineering and other related matters in the new embassy in Baghdad to provide ongoing support for all STE stakeholders engaged in collaboration and capacity-building in Iraq.