Information and Communication Technology and Peacebuilding: Summary of a Workshop

ISBN
978-0-309-12188-0

58 pages
8 1/2 x 11
PAPERBACK (2008)

Carol Arenberg and Greg Pearson, Editors

Information and Communication Technology and Peacebuilding: Summary of a Workshop

July 2008

Carol Arenberg and Greg Pearson, Editors

NATIONAL ACADEMY OF ENGINEERING
OF THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES PRESS
Washington, D.C.
www.nap.edu

NATIONAL ACADEMIES PRESS 500 Fifth Street, N.W. Washington, DC 20001

This study was supported by Contract No. IOP-07-191 between the National Academy of Sciences and the United States Institute of Peace and by a grant from Google, Inc. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the organizations or agencies that provided support for the project.

International Standard Book Number 13: 978-0-309-12188-0
International Standard Book Number 10: 0-309-12188-4

Copies of this report are available online from the National Academies Press: http://www.nap.edu.

Printed in the United States of America

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

The **National Academy of Sciences** is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. Upon the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Ralph J. Cicerone is president of the National Academy of Sciences.

The **National Academy of Engineering** was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. Charles M. Vest is president of the National Academy of Engineering.

The **Institute of Medicine** was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, upon its own initiative, to identify issues of medical care, research, and education. Dr. Harvey V. Fineberg is president of the Institute of Medicine.

The **National Research Council** was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Ralph J. Cicerone and Dr. Charles M. Vest are chair and vice chair, respectively, of the National Research Council.

http://www.nationalacademies.org

STEERING COMMITTEE FOR NAE WORKSHOP ON THE USE OF INFORMATION and COMMUNICATION TECHNOLOGY IN PEACEBUILDING

JOHN H. (JACK) GIBBONS, *chair*, Resource Strategies, The Plains, Virginia
VINTON G. CERF, Google, Inc., Herndon, Virginia
JANE HOLL LUTE, United Nations, New York, New York
RAJ REDDY, Carnegie Mellon University, Pittsburg, Pennsylvania
PATRICIA POWERS THOMSON, U.S. Institute of Peace, Washington, D.C.

Project Staff

GREG PEARSON, Senior Program Officer, National Academy of Engineering
JACQUELINE MARTIN, Senior Awards Assistant, National Academy of Engineering
CAROL ARENBERG, Senior Editor, National Academy of Engineering
ANTWUAN WALLACE, Christine Mirzayan Science & Technology Policy Graduate Fellow, National Academy of Engineering

Preface

On December 14, 2007, the National Academy of Engineering (NAE) U.S. held one-day workshop (see agenda, Appendix A) to consider how information and communication technology (ICT) can contribute to peacebuilding. People representing a variety of organizations and backgrounds attended (see list of attendees, Appendix B).

The workshop opened with an introductory talk on conflict in the 21st century, which was followed by two panels. The first panel examined successful cases of ICT use in peacebuilding; the second addressed the ICT-related challenges and opportunities faced by those working in zones of conflict. Designated respondents provided comment on each panel, and there was also general discussion. The meeting concluded with a plenary session on next steps and possible collaboration. This report, prepared by NAE staff, follows the same format as the workshop.

The project was funded by the U.S. Institute of Peace with additional support provided by Google, Inc. The planning of the workshop was substantially aided by the volunteer services of the workshop steering committee.

Jack Gibbons, *chair*
Steering Committee for NAE
Workshop on the Use of ICT in
Peacebuilding

Acknowledgments

This report has been reviewed, in draft form, by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Academies. The purpose of this independent review process is to provide candid and critical comments to assist the committee and NAE in making its published reports as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The reviewers' comments and the draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their reviews of this report:

George Bugliarello, Polytechnic University
Vint Cerf, Google, Inc.
Deborah Estrin, University of California, Los Angeles
Jack Gibbons, Resource Strategies
Arthur K. Reilly, Cisco Systems, Inc.
Colin Rule, eBay and PayPal
Trish Thomson, U.S. Institute of Peace

Although the reviewers listed above provided many constructive comments and suggestions, they were neither asked to endorse the views expressed in the report nor did they see the final draft of the report before its public release. The review was overseen by Louis J. Lanzerotti, New Jersey Institute of Technology, who was appointed by NAE to ensure that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the editors and the NAE.

In addition to the reviewers, the committee wishes to thank the project staff. Jacqueline Martin managed the committee's logistical and administrative needs, making sure the workshop ran efficiently and smoothly. NAE senior editor Carol R. Arenberg wrote much of the summary. Senior program officer Greg Pearson managed the project from start to finish.

Contents

OVERVIEW

On December 14, 2007, the National Academy of Engineering (NAE) convened a group of experts in diverse fields to consider the role of information and communication technology (ICT) in promoting peace and conflict resolution. The one-day workshop was designed to consider current and emerging technologies and strategies for employing them in conflict management and diplomacy. It also aimed to explore how organizations with a role in promoting peace, like the U.S. Institute of Peace, can most effectively leverage technology in carrying out their missions. (The full terms of reference for the project appear at Appendix C.)

The workshop's presentations and discussions surfaced a number of key issues, illuminated certain practitioner needs, and suggested possible next steps.

Key Issues

Participants acknowledged that ICT can be used for both good and ill. It can facilitate positive dialogue but also hate speech. It can mobilize nonviolent protestors but also violent mobs. It can be used to fight corruption but also to facilitate it. It can help peacekeepers locate refugees but also do the same for their persecutors. Those who would use ICT in the cause of peace need to be cognizant of the risks as well as the benefits.

Just as the decision to fight is made by individuals, so too is the decision to make peace. Workshop participants recognized that ICT will not by itself end conflict, but it can enable more effective peacebuilding.

Participants emphasized the importance of education, in particular the need to educate the young. Teaching children that there are nonviolent ways to deal with conflict is a good step toward a more peaceful world. ICT can facilitate that teaching.

Participants warned about the unintended consequences of using ICT. Simply giving people more information does not necessarily lead to predictable or positive results. As people become more informed, they may become more motivated to change their circumstances and to do so violently. Similarly, ICT can help a society increase its wealth, but competition for that wealth may also increase, possibly leading to conflict.

Engaging the ICT industry in peacebuilding efforts will require a "self-interested commercial market." The private sector will only become involved if they see that a long-term investment in peacebuilding will pay off.

Practitioner Needs

During the course of the meeting, participants identified a number of ways that ICT could enable peacebuilding (Table 1). Some ideas were very specific, while others were much broader.

For presentation purposes, the table is divided into four separate categories. However, a number of these ideas cut across categories.

TABLE 1 Examples of Practitioner Needs

General: ICT that supports
▪ Resiliency to misuse (e.g., robust data security)
▪ Interoperability between different peacebuilding entities
▪ Training and education (e.g., games, simulations)
Peacemaking: ICT that supports
▪ Face-to-face dialogues (e.g., interactive virtual meetings, wide-band teleconferencing)
▪ Mapmaking and border analysis, particularly for conflicts driven or exacerbated by border disputes
▪ Monitoring (e.g., peace agreement implementation, human rights violations, corruption)
▪ Story-telling, sharing narratives
▪ Reducing misperceptions about the capabilities or intentions of "the other"
Peacekeeping: ***ICT that supports***
▪ Locating and tracking fighters' movements (e.g., drones)
▪ Increasing peacekeepers' ability to see in extreme weather conditions
▪ Making peacekeeping forces appear larger than they are
▪ Detecting mines
▪ Locating refugees
▪ Tracking the flow of arms and illicit trade in natural resources
▪ Breaking down language barriers
▪ Preserving evidence of mass atrocities
Prevention: ***ICT that supports***
▪ Advanced warning of nascent conflicts through predictive analysis and modeling
▪ Giving disenfranchised or repressed people a voice
▪ Preventing the rise of, or the violent actions of, extremists
▪ Reducing competition for resources, including food, water, territory, and mineral resources
▪ Mitigating environmental degradation and climate change, which may exacerbate conflicts over water and food

- Building healthy states that can deal with conflict through nonviolent means (e.g., good governance, rule of law, sustainable economies, social well-being)

Next Steps

There was significant interest among workshop participants in continuing to explore the intersection of peacebuilding and ICT, and in mobilizing ICT companies in the cause of peace.

CONFLICT IN THE 21ST CENTURY

John H. (Jack) Gibbons, chair of the National Academy of Engineering (NAE) workshop steering committee, welcomed the group and introduced the first speaker, Richard Solomon, president of the U.S. Institute of Peace (USIP) and former assistant secretary of state for East Asia and Pacific Affairs. Dr. Solomon began by describing the history and Congressional mandate of USIP and his hopes for the workshop.

USIP was created by Congress in the mid-1980s as an independent institution "to strengthen our national capacity to deal with international conflicts without resorting to violence." At first the organization's efforts centered on research, but after the cold war, the group began to send people into zones of conflict around the world to work directly on conflict resolution projects, initially in the Balkans and now in over a dozen regions.

Dr. Solomon showed a graphic illustrating the phases of conflict management—conflict prevention, crisis response, peacemaking, peacekeeping, and post-conflict stabilization and state building (see Figure 1). As he explained, the methods of preventing, managing, and resolving conflicts vary depending on their phase and local circumstances.

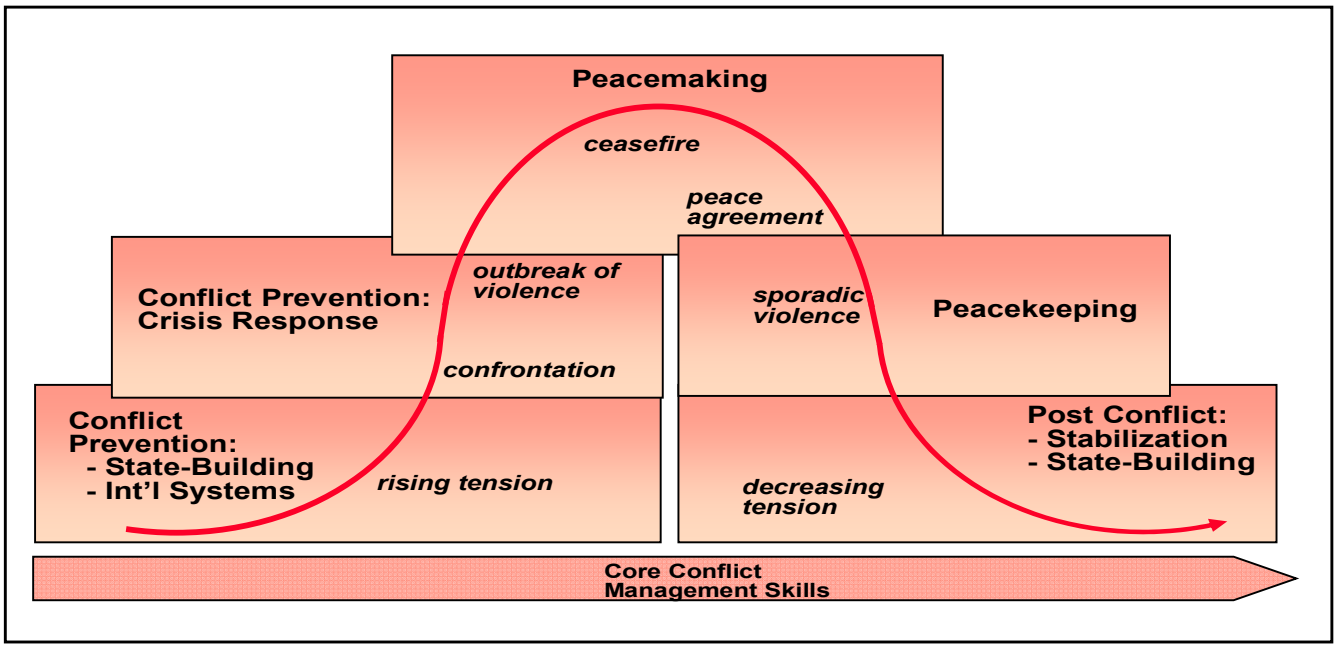


Figure 1 "Curve of conflict" illustrating the phases of conflict (below curve) and corresponding third-party interventions (above curve). Source: U.S. Institute of Peace.

Peace is always unstable, he said, and conflict seems inherent in the human condition. However, conflict that spills over into violence has enormous human and material costs. Therefore, the most important goal of USIP is to help manage conflicts so they do not degenerate into violence.

Drivers of Conflict

Unlike most conflicts during the World War II and cold war eras, conflicts today are being driven by new actors and new factors: religious extremism; social instability and failing states; economic and social disparities resulting from rapid development (e.g., in China and India); competition for resources, most obviously for petroleum and water, but also for diamonds, drugs, and other resources; weak international organizations resulting from the disintegration of superpowers (e.g., the Soviet Union) and colonial empires; and competition for weapons, particularly nuclear weapons, as international controls over proliferation become less effective.

Enablers of Conflict

Dr. Solomon pointed out the distinction between drivers and enablers of conflict. For example, a person may be motivated by religion to attack unbelievers, but he or she may be enabled by access to the Internet, an airplane, or a missile. An attacker must have both, and an effective prevention strategy must address both the drivers and the enablers. Take, for example,

nuclear weapons. In the 20th century through deterrence and nonproliferation strategies, nuclear weapons were more or less inaccessible to many groups. Today, we have people who are willing to die on behalf of their beliefs and who have more opportunities to acquire nuclear weapons, and so we must come up with new preventive strategies.

ICT in Peacebuilding

One role for ICT in peacebuilding is what USIP has termed "virtual diplomacy." The first step in the process is to build a network of communities—perhaps an electronic network—that can coordinate responses to humanitarian crises. The network might well involve other organizations that have not worked together in the past. For example, using the Internet, USIP was able to develop some measure of collaboration in the Balkans among the military, the U.S. State Department, and humanitarian assistance organizations, as well as between the leaderships of various religious groups.

In addition, USIP has encouraged use of the Internet to create virtual societies, such as among members of the Cambodian diaspora. Dr. Solomon worked with Prince Sihanouk on the peace agreement after the genocide there and helped create a global community of Cambodian émigrés. These virtual societies not only reinforce people's sense of empowerment, but they can also create the conditions for civil resistance, because information sharing increases transparency about world events and improves situational awareness in areas of conflict. For example, the people who brought down Philippine President Ferdinand Marcos, and subsequently Erap Estrada, coordinated their actions largely through cell phones. This is just one example, Dr. Solomon said, of how technology can change political dynamics.

But, he continued, technology can cut two ways. The enemies of peace and promoters of conflict have also learned to use the Internet to communicate globally, spread propaganda, indoctrinate people, raise funds, and coordinate action. Thus assessing ways to use ICT in the service of peacebuilding is a major focus of the work of USIP.

After a decade of work on virtual diplomacy, USIP developed a conceptual basis for thinking about the interplay between ICT and conflict, and the organization now wants to pursue follow-on activities. A major goal of the workshop, he said, was to gain insights into how USIP can use technologies, such as cell phones and computer imagery, more effectively and in a more intellectually disciplined way. The organization hopes to coordinate future collaborative projects with NAE and groups in other communities to pool ideas and energy, which will lead to innovations in using technologies to manage conflict and promote peace.

PANEL 1
ICT IN THE CAUSE OF PEACE

The first panel highlighted three case studies of the use of ICT in peacebuilding. The first examined the use of cell phones and text messaging in election monitoring; the second explored the use of geographic information systems for managing land-use conflicts; and the third

presented a variety of web-based approaches for sharing information among civil groups engaged in peacebuilding activities.

The Use of Mobile Phones in Election Monitoring

Christopher Spence is director of technology strategy and programs for the National Democratic Institute for International Affairs (NDI), an international, nonprofit, nonpartisan organization funded largely by the U.S. government, with additional support from foreign governments. NDI provides assistance to governments, legislatures, civic groups, women's groups, political parties, and other partners by developing programming to promote the creation of stable environments and peaceful transitions to democratic government. NDI operates on the premise that democratic societies tend to be less conflict prone than other societies.

Mr. Spence opened his talk by noting that using technology for peace has a lot of promise but few realized applications so far. NDI, he said, recognizes that every political system has the potential to become unstable and that conflict is inherent in political life. The organization works toward channeling those conflicts in a positive, nonviolent direction. One of the problems NDI tries to address is weak institutional capacity, by pinpointing weaknesses and directing its intervention toward shoring up those critical links in the democratic chain.

Election monitoring is one component in building a democratic assistance program, because elections are milestones in building democracies. However, every election has a critical point at which it can go either well or badly. NDI's approach in tense political environments is to take the "right kind of action" when something goes bad (e.g., cheating in an election) to keep the process moving forward and not let it deteriorate into violence.

One effective way of monitoring elections is to send out members of civic groups, who have been trained to observe and report specific information, to provide domestic oversight of their own elections. These groups must be nonpartisan and must have established their credibility so they will be considered reliable sources of information.

In the pre-election period, monitors note violent incidents in the political environment, how the political parties are portrayed in the media, and how voter registration is conducted. In many of the countries where NDI works, there are internally displaced people who typically have not participated in an election before. It is important that monitors make a list of these people and deliver it to the polling stations to ensure that these people will be eligible to vote. NDI creates programs for auditing voter rolls to make sure they are accurate.

On election day, hundreds or even thousands of observers head to polling places noting such things as voter turnout and whether any voters have been disenfranchised. They also observe how the election itself is conducted. Are officials following the rules and allowing people to participate? Are all of the votes being counted? Are the ballot boxes being stuffed? Observers then text message the answers to key questions via their cell phones—say, related to voter turnout at nine, eleven, and one o'clock. The numbers go directly into a central data base or repository. Text messaging is a rapid, reliable, and accessible reporting tool.

After the election, monitoring programs assess the results by using "quick counts" or parallel vote tabulations (PVTs)—much like exit polling in the United States. A PVT is a statistical random sampling of polling stations throughout a country or region that can be used to project an accurate result. In addition, the public statements by the monitoring group(s) must be credible so that when they confirm, or contest, the election result, they have the public trust. "The overall objective is to keep democracy moving forward and not to stir up more conflict," Mr. Spence said.

Mr. Spence gave an example of how this kind of monitoring works. The first time an estimate-based reporting system was used was in 2006 in an independence referendum in Montenegro, when a group called the Center for a Democratic Transition (CDT) deployed hundreds of observers. One of the most important measures was voter turnout, because there was a 50-percent threshold requirement for the election to be legitimate. At about one o'clock, CDT monitors were able to confirm that the threshold had been met, and the media announced that the election was "for real."

After the polls closed, the vote was still too close to call. When CDT confirmed that the election was in fact too close to call, the public was persuaded to await the official result. Because CDT was a legitimate watchdog group, their word had a stabilizing effect (even though another group had made an incorrect projection earlier in the day). In the end, the referendum passed by just 2,000 votes, within 0.5 percent of CDT's projection.

Text messaging in an election-monitoring context has two dividends, Mr. Spence said. First, it provides accurate, reliable, public statements quickly enough to have a political effect. As long as the monitoring group has the public trust, text messages increase confidence in the election results and reinforce the integrity of the process. Second, text messages provide real-time reporting of incidents, such as violations of electoral law, for example if a polling station doesn't have election materials on time and opens late. Observers report that back to the center, then go to the election officials and try to remedy the situation, which can reduce the potential for conflict. This is especially important if a violation, either accidental or deliberate, occurs in an ethnic minority area or a minority opposition area.

Discussion

One listener noted that the kind of monitoring described by Mr. Spence could only be done in a country in which the government had agreed to the monitoring. Another added that in some situations, if people are organized to express themselves this way, the government might object strongly.

Mr. Spence answered that, in a typical situation, electoral administrators have the ability to credential nongovernmental organizations (NGOs) to monitor an election. So even if the government doesn't really want monitoring, there is usually enough international pressure to force them to agree. However, he admitted that monitoring can be a politically sensitive issue.

Another listener noted that as independent monitoring becomes accepted as a way of ensuring the credibility of an election, the pressure on a government to allow it increases. He

then described the situation in the Philippines in 1986, when an independent monitoring organization was crucial to the ouster of President Marcos.

Mr. Spence cautioned that text-messaging technology itself could be used for good or ill. Obviously, a dictator might object to putting this technology in the hands of people, but a government might also object, depending on the goals of the group wielding the technology. NDI, he said, promotes democratic values (such as transparency, accountability, and citizens having a voice in their representation), not necessarily a certain kind of democratic system.

GIS and Participatory 3-D Modeling in Land-Use Negotiation

Giacomo Rambaldi is a senior programme coordinator of the Technical Centre for Agricultural and Rural Cooperation (CTA), an organization based in the Netherlands. CTA is active in development, particularly in areas of Africa and Southeast Asia where few people have access to the Internet or high-tech devices. The organization, Mr. Rambaldi said, works in the context of "self-determination, indigenous people . . . claiming rights over land and resources, resource planning and management, collaborative research, management and evaluation of territorial conflicts, safeguarding of tangible cultural heritage, and identity building."

Among other duties, Mr. Rambaldi oversees a 1,500-member web-based forum in English (and smaller forums in French, Portuguese, and Spanish) on participatory spatial-information management and technologies and the ethics of mapmaking. He also provided information about several related web sites (Box 1).

BOX 1 Web Sites Relevant to Participatory 3-D Modeling

- Open forum on Participatory Spatial Information Systems and Technologies: *http://www.PPgis.net*
- Integrated Approaches to Participatory Development: *http://www.iapad.org*
- Blog on PGIS/PPGIS: *http://participatorygis.blogspot.com*
- WebRing on Public Participation GIS (PPGIS) *http://t.webring.com/hub?ring=ppgis*

Mr. Rambaldi explained what participatory 3-D modeling is and gave examples of how it has been used to resolve conflicts, most often in remote areas between indigenous peoples with different levels of education and cultural backgrounds, and even speaking different languages. Most of these areas are largely inaccessible, sometimes with no electrical power or even buildings to store equipment.

3-D modeling is part of a family of tools based on visual language, multimedia, and multiple spatial dimensions. A combination of high-tech and low-tech methods, 3-D modeling is a community-based mapping process that combines indigenous spatial knowledge with other data in the form of a tangible, topographical model that can be easily understood by people of all ages, regardless of language, culture, or educational level. The model, a "tangible translation" of geosynchronous satellite imagery and local knowledge created by the communities that are parties to the dispute, enables people who are not used to reading maps or 2-D geographical images to see their land from a bird's-eye view. The creation of the tangible map necessarily involves peer-to-peer dialogue among disputants who promote their issues and concerns and pinpoint areas of disagreement. With the help of project coordinators, boundaries and other features of the topography are eventually agreed upon, at which point the elders of the communities examine the map and negotiate final adjustments (Figure 2).

FIGURE 2 Dan Lai, Thai, and Kinh hill tribe Peoples negotiating territorial issues on the 1:10,000-scale participatory 3D model of the Pu Mat National Park area including its buffer zone. November 2001, Nghe An Province, Vietnam. Source: Giacomo Rambaldi. Used with permission.

The model is then used to generate accurate computer maps incorporating the decisions agreed upon by the disputants that can be used for planning future land use. Each project requires a multidisciplinary team, including anthropologists, social scientists, natural resource managers, community organizers, and geographers.

Mr. Rambaldi presented a case study of a very complex conflict in the Philippines involving 18 boundary disputes among seven ethno-linguistic groups; intertribal disputes about access to

natural resources and government funds; violations of traditional peace agreements (*bodongs)*; unclear, ambiguous, or unknown boundaries between tribal areas (*barangays)*; and infringements of personal rights.

Bodongs have been used for centuries in the Philippines to define intertribal relationships, minimize warfare, define boundaries, and deal with infringements. However, they usually do not include images or maps, and, over time, the documents are often lost or are too vague for later generations to agree which mountain is highest or which big tree marks the limit of a *barangay*. The special advisor to the peace process in the Philippines commissioned a group headed by an NGO that specializes in 3-D models to facilitate the negotiations.

The model that was created, over a period of months in this case, was on a scale of 1:5,000 and covered 700 square kilometers. Individuals representing all of the parties to the dispute worked together, at first reluctantly and mistrustfully. Finally, however, they created a hands-on scale model of the disputed territory. Boundaries were indicated by moveable color-coded lines, with the exact locations and corners negotiated by the elders of the disputant communities, who wrote down the landmarks (e.g., a corner marked by a big tree or a large rock).

Once the model was finalized, the boundaries were confirmed by a group on the ground using GPS. Maps were then devised based on the model showing landmarks, elevations, vegetation and ground cover, watersheds, roads, buildings, farms, even households. The resulting map was much more detailed and accurate than existing maps. In many of these disputes, Mr. Rambaldi said, the only existing maps of a disputed area may have been created by the American military during World War II. The boundaries of the new map are then made official by title deeds.

Participatory 3-D mapping accomplishes many objectives:

- The model, and subsequent maps, provide common denominators for landmarks and legitimize decisions at the grassroots level. The information on the map provides a shared perspective and a common language for addressing conflicts.
- The mapping process ensures participation by all parties and ensures their control over the process and outputs. Simple, ordinary people have access to the medium, and everyone from children to elders participates.
- Mapping facilitates, indeed, requires the sharing of information among the generations, as well as peer-to-peer communication among individuals from different cultural and ethnic groups.
- People who are not educated in reading maps internalize their spatial understanding. The model expands and re-scales their spatial framework, providing a first-time view of entire systems, such as watersheds. Thus people gain the ability to generate, manage, analyze, and communicate spatial information in new ways.
- Mapping can empower disadvantaged groups. For instance, if the information from the map is published, it adds value and authority to local knowledge, and indigenous people may then be able to communicate, peer-to-peer, with government officials and participate in decisions that affect them.

- Unlike Google Earth and other high-tech programs, these maps show burial grounds, sacred places, and other features of great significance to local people. Thus they provide a visual language that bridges linguistic barriers.

Mr. Rambaldi cautioned, however, that mapping is not a panacea. Once local knowledge becomes public knowledge, for example, outsiders can use that information to locate and exploit natural resources. In addition, indigenous boundaries are not necessarily fixed lines but may be seasonal, based on grazing patterns. Governments may use the mapping data to draw straight lines that cross watersheds or divide grazing areas to designate municipalities. Those who generate and share their knowledge need to be prepared to deal with these new realities and potential conflicts. Ultimately, he concluded, people are excited by "becoming aware that they know, and that what they know is important to them and to their community."

Discussion

A member of the audience asked how effective a 3-D model would be in a place like Bangladesh, which is almost perfectly flat. Mr. Rambaldi replied that any topology could be modeled to include the features that are significant to the people who live in the area. People are intimately aware of the features of their environment, such as water patterns, fertility patterns, even variations in the taste of honey in different areas. "We are aware that different people use different criteria to classify where they are living. We must be open to diversity."

Another attendee pointed out that giving people better information than they had before, for example, informing everyone of the importance of the watershed and the consequences of not having it in their territory, might lead to even more conflicts than before. Mr. Rambaldi agreed that the moment people visualize boundaries, they could be creating new sources of conflict. "Introducing new knowledge is a very delicate, but powerful and risky process."

Someone else noted that tribal elders have traditionally found equitable ways of resolving disputes. Technology could make that process even more transparent. Mr. Rambaldi replied that traditional ways of handling resources often have eroded over time, particularly as a result of the imposition of "modern," municipal boundaries drawn up by government, for example based on a watershed, as happened in the Cordillera region of the Philippines. In addition, traditional dispute-resolution systems were sometimes violent, rather than equitable. Participatory 3-D mapping can help with resource control and access in some of these situations.

Another participant suggested that creating economic well-being was a greater deterrent to fighting than resolving boundary disputes. He went on to say that "calling mapping technology [a peacebuilding tool] is mistaking a vehicle for a principle." He argued the tendency to engage in conflict is human nature. This led to a discussion about the increasing urbanization of the world and the need for well designed cities that give people a shared sense of participation in community infrastructure, thus reducing the likelihood of conflict. Several participants agreed that involving communities in filtering information and authorizing its use "builds trust."

The Role of Civil Society and ICT in Peacebuilding

Sanjana Hattotuwa is the head of ICT and peacebuilding at InfoShare, a technology services provider for social change makers based in Colombo, Sri Lanka. InfoShare, Mr. Hattotuwa said, supports systems for governance, sustainable content development, training for rural entrepreneurs, IT skills through vocational training curricula, and ICT-related workforce skills**.**

He explained how, in 2003, he and a few others decided to create an organization to use ICT to design solutions for conflict transformation. Now a Microsoft Unlimited Potential (UP) partner, InfoShare designs and deploys UP training curricula and methodologies; provides training in IT skills for non-profits; and provides basic financial management packages for non-profits to reinforce the accountability, sustainability, and transparency of their operations.

Mr. Hattotuwa described his efforts to use ICT to transform the violent conflict in Sri Lanka, which has been raging for the past 25 years. Just two weeks earlier, he noted, a bomb had killed about 20 people and injured 40 just a few minutes from his house. In spite of the difficult circumstances as well as because of them, InfoShare uses a range of technology to prevent, mitigate, and transform violent conflict as well as strengthen democratic governance and human rights. InfoShare's approach is based on the notion of "satisfycing" solutions, or doing as much as possible within the limits of the highly volatile and violent conditions on the ground.

InfoShare is increasingly leveraging the widespread availability of mobile phones in Sri Lanka to complement the use of PCs as tools of conflict transformation. A significant problem in this regard is the multiplicity of communications standards, which limits interoperability among different systems and vitiates sustainable outcomes. Mr. Hattotuwa emphasized that "interoperability can save lives." For example, rescue and reconstruction operations after the December 2004 Asian tsunami were hampered more by the lack of coordination and collaboration, he said, than by the lack of funds. "Everybody operated in silos. We know that interoperability is crucial. Things are changing," he said, "but very slowly." Mr. Hattotuwa said InfoShare tries to use off-the-shelf tools to ensure that information can be communicated between organizations as well as within organizations in civil society.

InfoShare's leadership has been recognized by the ICT4Peace Foundation, based in Geneva, Switzerland, and established after the World Summit on Information Society (WSIS) to pursue Paragraph 36 of the WSIS Tunis Declaration, which posits the central role of ICT in peacebuilding. In 2005, Mr. Hattotuwa joined the foundation as a special advisor. In a series of slides, he showed examples of what InfoShare has done:

- created a virtual "one-text process" designed to facilitate real-time and asynchronous peace negotiations based a technique that has been used in the past by, for example, the United States in the conflict between the Israelis and Palestinians. The process engages political parties or stakeholders in a way that transforms, rather than ratchets up, emotion, he said. The essential idea is the creation of a single text in a collaborative manner, with the parties to the conflict drawing up the text themselves.
- is developing an online peace library for Sri Lanka and South Asia, which will contain credible and trustworthy resources relevant to conflicts in the area.

- developed a web based anti-corruption program (*http://www.ard-acp.com*) for the U.S. Agency for International Development (USAID). The idea behind the program is that "all people should have access to information that directly affects their lives." One section of the site provides StreamReader-friendly information to visually handicapped people. Another provides warnings and information from the International Federation of Journalists about corruption in government.
- designed a YouTube channel (*http://www.youtube.com/vikalpasl*) that documents, through short videos, narratives of lives in conflict rarely portrayed in mainstream media.
- designed Voices of Reconciliation Radio (*http://radio.voicesofpeace.lk*) that uses podcasts to explore alternative perspectives on war, peace, human rights, and governance. Mainstream media and other civil society organizations have made CD recordings and sponsored workshops to disseminate this information to people who have no access to the Internet.
- launched a citizen journalism site (*http://www.groundviews.lk*), which posts articles that do not appear in the mainstream media. The site was recently awarded an Excellence in Journalism Award from the Society for Communication Research in Boston.
- created a site for monitoring and recording human rights violations in Sri Lanka. "Although the idea behind the site is quite simple," Mr. Hattotuwa said, "there isn't anything else in the world like it." The site uses information provided by two human-rights organizations in Sri Lanka and records violations in the globally recognized HURIDOCS documentation format.

Mr. Hattotuwa then turned to the subject of data security. Governments, he said, are becoming increasingly IT savvy and beginning to ban access to websites. Infoshare is working to raise awareness of the need for data security and what to do if information is "taken away forcefully."

As part of USAID's Last Mile Initiative, Infoshare helped develop and deploy a franchised-enterprise business model for WiMax-enabled community technology centers; identify and select as many as 30 franchises in about five rural areas of Sri Lanka that would provide wireless-enabled ICT services, such as VOIP, Internet access, and computer training; and attract private investment to facilitate the expansion of the franchise model throughout Sri Lanka. In the meantime, Intel, several mobile phone providers, and Microsoft have all contributed services or technology. The goal is to operate independently of government subsidies, said Mr. Hattotuwa.

Discussion

An audience member again raised the question of the positive and negative uses of information. He asked Mr. Hattotuwa how ICT is actually contributing to a peace-building process, especially in light of the fact that government authorities are making very different use of the same information. Mr. Hattotuwa answered that the Sri Lankan government uses ICT to promote its own line and its own propaganda, both locally and internationally. He said he understands that simply introducing ICT does not necessarily strengthen civil society. "Technology can be constructive," he said, "if used in a way that furthers balance. . . . Using the

wrong technology at the wrong time or in the wrong way or wrong language can even be a force for destruction."

Another participant noted that cell phones are also being used as triggers for IEDs and as networks for putting IEDs in place and that information available on the Internet has been used to construct IEDs. We know there will always be people who abuse technology, he said, but we should continue to figure out how to use ICT in positive ways.

Comments by Respondents

Three respondents were asked to comment on the topics raised in the panel presentations. The respondents for this panel were Irwin Jacobs, chairman, Qualcomm; Deborah Estrin, professor of computer science, UCLA; and Bran Ferren, co-chairman and chief creative officer, Applied Minds.

Respondent 1: Irwin Jacobs

Irwin Jacobs, chairman of Qualcomm, focused his remarks on the use of cell phones. His concern, he said, was about the integrity of the information being gathered from election monitors equipped with cell phones. "How can we ensure the validity of the information if a government is trying to distort the results," he asked. He went on to suggest that some capabilities of cell-phone technology, such as GPS and putting time stamps on information, could help.

When cell phones were new, Dr. Jacobs said, providers focused on making sure transmission was ubiquitous, ensuring high data rates. The business question was how to get phones into the hands of vast numbers of people at a very low cost. As with all electronics, he noted, the prices keep coming down.

Now, he said, the focus is more on applications. Besides communication capability, phones now have more and more computing power, such as GPS, cameras, video capability, computing and digital signal processing. In fact, some people now liken the computing power of cell phones to the power of supercomputers of about 10 years ago. Even more important, he said, is the ability to download new applications, update them, and make them more pertinent.

Qualcomm is always looking for interesting projects in which it can participate, and the company already sponsors a number of them. Expanding education is a major goal. Giving people more information is critical to offsetting the very narrow education many of them have received. A key question is how cell phones can be used to accomplish this. They are ideal for disseminating information, he said, because they are very reliable, practically ubiquitous, and inexpensive enough for people to take home. Now it is up to Qualcomm and all of us, he continued, to learn how to take advantage of the capabilities of cell phones for education.

Health care is another area in which cell phones can be useful. For example, sensors attached to cell phones are already being used to test blood. In addition, the high data rate has proven to be beneficial for communications in remote clinical settings.

A variety of Qualcomm projects involve the financial sphere, such as micro-finance. Qualcomm has also been working with fishermen to deliver information to them on their boats about types of fish, prices, best places to land, as well as weather conditions, weather warnings, and so on. Similar projects are being conducted in agricultural areas. Ultimately, small projects like these have been very successful.

Cell phones can also be useful in disasters. For example, Qualcomm is working on a project to track bird flu by keeping track of animals, pinpointing locations of outbreaks of disease, and circulating information as early as possible. Another example is how cell phones were used during the wildfires in the San Diego area last year. In that case, the reverse E-911 was very helpful in getting information to people rapidly about vacating threatened areas. Cell phones could be important for warning of tsunamis as well.

Finally, Dr. Jacobs suggested that cell phones with GPS capability might be useful in conjunction with 3-D mapping for pinpointing locations and thus speeding up the mapping process.

Discussion

A member of the audience noted that an important aspect of cell phones for peacebuilding is that they can be used to "enable identity" in communities and networks. They are also beneficial for governance. For example, a system is being put in place in Afghanistan for making direct payments to policemen in their villages, thus eliminating some of the corruption encountered when intermediaries deposit the policeman's money.

Another person returned to the subject of election monitoring. Mr. Spence had mentioned that information collected by many people in different locations is sent to a central monitoring site. But it would also be important for the site to send information back to a large number of polling sites to let observers know what is happening in various places, providing them with what the military calls situational awareness. Even if it might be dangerous for everyone to have information, he said, "if the information is out there, we should organize it to take advantage of it."

Respondent 2: Deborah Estrin

Deborah Estrin is a professor of computer science at the University of California, Los Angeles. Prof. Estrin began by describing mobile phones as part of a technological ecosystem. With 50-percent penetration, cell phone technology is now accepted by people everywhere. Therefore, she said, it can be taken as a given and combined with other technologies. "Data that comes by itself on the phone," she said, "is nowhere near as powerful as when you combine it with mapping technologies and GIS models and so on." Combined, these technologies can

provide annotation, discretion, and combinations of data in the context of Internet-based model mapping. "This is not a panacea," she cautioned, "but it is a great opportunity."

She than reiterated a point that had been made several times before—that as valuable as information is, it can also be a target for abuse. In fact, the more valuable the information is, the more tempting it is as a target. Voting machines, she said, are a good example. Technologies that provide sensitive information must be protected from corruption.

Another example of the benefits and dangers of using cell phones is that location can be traced. On the plus side, this can assist in finding people and can be used to "transform science and public health services." On the minus side, location traces can allow individuals to be targeted or persecuted. When a person geo-codes a text message and sends it, they have provided a time-sequenced trace of where they are. To protect users, she argued, researchers should investigate architectures that enable the controlled release of information, for example, releasing statistical summary information rather than raw data.

On an upbeat note, she concluded, a new generation of young people is studying technology and engineering and may soon be prepared to address these challenges.

Respondent 3: Bran Ferren

Bran Ferren is co-chairman and chief creative officer of Applied Minds. He focused his remarks on three topics: (1) the need for caution when using a technology for purposes for which it was not intended; (2) the value of geospatiality and 3-D mapping; and (3) the limitations of using technologies without regard for their aesthetic, story-telling effect.

On the first topic, Mr. Ferren pointed out that the people who design text-messaging protocols and security systems, as well as the people who own and control phone systems, "may not be your friends." In fact, he said "these things are often influenced directly by governments."

Therefore, he counseled caution about using text messaging to guide events or influence an election, because these devices are not designed to be highly secure. This does not mean text messaging should not be used, he said, but it does mean the users must understand the implications of their use. "Educating the public is not just about building confidence that you are there and reporting on what is going on. It also means talking about the pros and cons of the technologies and other devices you use."

In addition, Mr. Ferren said, the public is more informed and intelligent than is usually assumed and is capable of taking in a discussion of the benefits and risks of new technologies. Public discussion of these issues is essential to "sensitizing" people and to the true benefits and risks of technologies.

One of the advantages of cell phones is that people do not have to be able to read or write to use them. If the target population for election monitoring has a high rate of illiteracy, then obviously text messaging could not be used. Even with text messaging, however, problems can

arise about the reliability of the system and difficulties can be encountered with parsing and sorting techniques. "An error in one line of code can undo all of that reporting," he said.

As for the second topic, the value of geospatiality and 3-D maps, he cautioned that "the technology must be separated from the modality of visualization, that is, from the social interactions of how it is used collaboratively. There is nothing intrinsically real about a 3-D tabletop model," he said. "It is just another form of abstraction. Only the world that surrounds us is real." Therefore, he said, 3-D mapping should be understood as a different method of abstracting information that can help people understand things through a shared creation.

Although he is a firm believer in the value of hard models, he said, many governments try to ensure that their populations are taught from a specific perspective that matches the administration's agenda. "Simply giving people more information does not necessarily lead to a predictable result."

On the third topic, human beings remember their world and interact with it via stories that take place in three-dimensional space, Mr. Ferren said. Mention the Eiffel Tower, the Statue of Liberty, or the World Trade Center, and people immediately see an image in a certain context. So, using technology to help resolve conflicts requires (1) having a clear idea of the problem, (2) knowing who the audience and participants are, and (3) choosing the best technology for the specific situation.

Hard-mapped geospatial representations work well on certain scales, he said. They do not work well on a microscopic scale, however, or on a very large scale. Making a model the size of a room to represent a one square inch area would not be effective. Nor would the same size model work for an area of 10,000 square kilometers.

Graphic computing, touch computing, three-dimensional, two-and-one-half dimensional, textual, and four-dimensional computing are part of a tool kit. The technology used in any particular project must be appropriate to the audience and the situation on the ground. Perhaps a model that shows how things can be changed just by removing or adding something will be most effective. In some cases, even drawing on a napkin can be "more compelling than using a computer." The whole idea is to use the right tool to tell the story and expedite the matter at hand for conflict resolution, keeping in mind that "story telling is fundamental to conflict resolution."

Mr. Ferren then turned to the technologies used by InfoShare. "Although the best technology may be invisible," he said, "the best design is not." The question is deciding how to design "the correct experience in the context of collaboration . . . [which is] a story-telling problem."

The group gathered for the current workshop is a case in point, he said. These individuals, including himself, came together because they believe that physical participation is qualitatively different from virtual participation. "Eighty percent of a typical meeting" he said, "is nonverbal communication . . . gestures, intonation, facial expression, eye contact, body language. These are all part of the social dynamics of bringing a group together."

He then returned to the terrain models discussed by Mr. Rambaldi. The positive, he said, was that people were working together. The negative was getting them into the room together. Although person-to-person interaction has a certain value, so does film and video, which can have a broader reach, he said, because they can be repeated and are not "perishable."

In conclusion, he said, "invisible technology is great, but invisible design is not great." An experience must be designed to optimize the effect. "Effect-based design," he went on, "requires intentionality, as well as an understanding of the storytelling process. . . . [F]inally, we are aesthetic creatures living in an aesthetic environment, and we self-select based on those aesthetics. That is what has been missing in our discussion so far."

Discussion

The first speaker took up Mr. Ferren's comments about the value of face-to-face meetings. In most cases, the speaker said, the physical group will dissipate, as will the effect of the meeting. To heighten the effect of the meeting, he said, intensive, interactive, rich media "design spaces" could be designed to continue the dialogue and discussion.

Thus face-to-face meetings, which are very expensive and difficult to organize, can be supplemented with interesting, distributed, collaborative activities. He particularly recommended Web conferencing, which is inexpensive, collaborative, and includes some media. In addition, Web conferencing enables participants to view and mark slides and look at data and simulations simultaneously in real time.

Mr. Ferren agreed that extending the experience of a face-to-face meeting is critical to its ultimate success. However, he said, the developed world was not willing, "because of the expense," to use the most effective technologies when dealing with problems in Third World countries, even though the cost to the free world of *not* dealing with these issues is exponentially higher. He suggested that one could use a wideband teleconference link to bring two hostile tribes together that might kill each other if they were in the same room and present them with a novel conflict resolution using "the very best high-resolution, high-depth, optical fiber . . . and put in a Satcomm link if necessary."

He said that meetings like this workshop always focus on the cheapest tools that can be used. At a certain point, he went on, the value equation has to be revised. Significant amounts of money, even $5 million, for a high-bandwidth technology in a troubled portion of the world, might cost much less, even if measured only in dollars, than a war, which could cost billions.

A second speaker re-addressed the idea of storytelling, that is, the human experience of conflict as opposed to the objective experience of conflict. He said that as an advisor to parties in disputes, he tells them to "go up to the balcony" and focus on specific information about a conflict, rather than on the data. Once they are out of the "objective context," he said, they can often resolve questions.

He also described his experiences in Eritrea, where a border war had killed some 60,000 people. Even though the International Court of Justice had brought in GPS systems and mapped the region, the disputants were prepared to go back to war. Data did not solve the conflict

because, he said, the war was not fundamentally about the border. Engineers love data, he went on, but conflicts are often not about data.

The discussions have centered around computers as arithmetic engines rather than as communications tools, he said. Ultimately, conflicts are not about better data or counting every single vote. They are about communication. Even the best technology in the world, he said, cannot simplify the human experience of a conflict. Designing the tools Mr. Ferren described will require an understanding of the anthropological, sociological, and psychological aspects of a conflict.

One of the participants then turned the attention of the group to the limitations of map-making used during the 1995 peace talks in Dayton, Ohio, to end the war in Bosnia and Herzegovina. He said that Serbian President Slobodan Milošević, Bosnian President Alija Izetbegović, and Croatian President Franjo Tuđman were struggling over a boundary established on many American-made maps. The speaker was able to supply information based on his own reconnaissance of the same area, pointing out that the lines on the maps were "one farm off" compared to what he had just seen.

Once the treaty was signed, the speaker, who was responsible for implementing it, found that one boundary was wider than the property over which the fighting had taken place. Only a detailed topographical map, such as that described by Dr. Ramaldi, would have averted this problem, because the line had to be carefully drawn based on the very personal information of one of the disputants who told him that the land in question belonged to his grandmother. "I know it is easier to enforce a line on a road," the man said, "but you have to put the line on the fence." The point is, the speaker continued, that a lot of issues must be taken into account, not just root causes, but also some symptoms.

The next discussant went further and talked about the need to address both institutional and personal levels in resolving a dispute. "Using ICT to promote situational awareness is one thing. Mediation and communication is another." The stories of people affected by conflicts are now becoming available through technologies, such as those provided by Mr. Hattotuwa, and these stories are very powerful. At the same time, other forces are trying to keep those stories from being told. For example, in Burma, he said, mobile phones were used to show what was happening there until the government cracked down on their use. Stories are still being communicated, however. Technology is changing the rules of the game.

The reason cell phones are important, commented another participant, is that they are there and can be used without injections of money and resources from the outside. Clearly, she said, conflicts are about story telling as well as data. Cell phones can provide an affordable way of conveying a story.

Another workshop attendee addressed an "anthropological" view of conflicts. Many conflicts, he said, are about the few attempting to dominate the many. Technology can even the playing field for the many and give them a way to resist domination.

PANEL 2
IN THE FIELD: CHALLENGES AND OPPORTUNITIES

The second panel presented three case studies illustrating the challenges and opportunities peacebuilders face in the field. The first examined issues related to preventive and crisis diplomacy; the second explored the role of gaming in strategic nonviolent conflict; and the third addressed the special needs of those engaged in peacekeeping and post-conflict peacebuilding.

Preventive and Crisis Diplomacy

John Packer is director of the Human Rights Centre and professor of international law at the University of Essex. For nine years, Prof. Packer was senior legal adviser and then director of the Office of the High Commissioner on National Minorities in the Organization for Security and Cooperation in Europe (OSCE), an institution dedicated to prevention of conflict through quiet diplomacy.[1] He has worked with transitional societies across Eastern Europe and the former Soviet Union, as well as in Iraq, Sri Lanka, Afghanistan, the Central African Republic and elsewhere both independently and with intergovernmental organizations to encourage institutional capacity building for effective preventive diplomacy. He participated in the workshop via videoconference.

Based on his experience, Prof. Packer said he has learned that personal contacts are fundamental to comprehension and that storytelling and the ability to relate are crucial to resolving conflicts. Most conversations, he said, whether diplomatic or not, begin with some sharing of human experience. In the Middle East, for example, conversations usually begin with tea or coffee and talk is about family and the weather. Establishing trust and confidence through such simple contacts can be frustrating to some, but opportunities for personal exchange are vital. He then gave several examples, including a description of the crucial role of storytelling, metaphors, and the challenge of interpretation in the meeting between U.S. President Ronald Reagan and Soviet Premier Mikhail Gorbachev in Reykjavik, Iceland, in 1986.

Prof. Packer offered some "minimum definitions." Peacebuilding is a construction, he said, a process that implies a normative element (peace) and an action (building). Peacebuilding is open ended; there is no point at which you have finally built peace and succeeded. Peacebuilding can be said to be a perpetual process that requires the creation of institutions that respond to, foresee, and facilitate the management of conflicts, which are inherent in human life and society.

Conflicts include competition for space, material goods, time, power, prestige and so on. He said the minimum requirement of preventive and crisis diplomacy is not actually building peace, but ensuring the absence (or at least control) of violence. Conflicts continue and are not necessarily bad. The goal is not so much to solve conflicts but to put constraints on violence and minimize or eliminate the destructive consequences of violence. This requires reconciling competing interests, needs, and aspirations—in other words, managing rather than solving.

[1] For a summary and analysis of the work of the OSCE High Commissioner, see W. Kemp (ed.) *Quiet Diplomacy in Action: The OSCE High Commissioner on National Minorities* (The Hague: Kluwer Law International, 2001).

If the idea is taken a step further, one can not only work toward the absence of violence, but also seek to maximize productive capacities, create wealth, and contribute to the general well-being of people. By the latter, he said, he meant not only physical well-being, but also social, psychological, and even spiritual well-being.

The minimum (i.e., the absence of violence, organized violence, or anarchy) is sometimes called negative peace, which is no small achievement. "Job number one, for which most of the world would be greatly appreciative, is to achieve negative peace," he said. To actually build peace requires transforming negative peace to positive peace, which includes declaring the value of life per se, and creating opportunities and standards for social stability and trust that enables planning and investment in economic and social development, what might be called "civilization." In short, peace building implies moving beyond negative peace, and even positive peace, to "our way of conceiving of others and engaging with them."

Giving citizens opportunities to invest individually and collectively in their lives and to direct resources toward constructive purposes for their societies requires certain conditions. First of all, there must be confidence, which is partly the absence of fear. A society unencumbered by destructive forces and with legal order and institutional guarantees promotes freedom. That kind of society, he said, "should be the aim we have in mind." But this is obviously a long and difficult process.

First, one must deal with the situation as one finds it, often a crisis, which is an immediate condition, the verge of war, the imminent eruption of violence, or sometimes the immediate aftermath of violence. Sometimes—increasingly—it is anarchy (i.e. the "failed State" phenomenon). If intervention takes place before a crisis, prevention and preventive diplomacy can possibly keep the crisis from developing. In this situation, prevention means not structural prevention (such as macroeconomic organization and so on) but operational prevention (i.e. addressing proximate causes of violence, notably triggers, usually through some kind of diplomacy). One must find ways to prevent violence by addressing specific risks to control and diminish them.

Diplomacy is simply talking, not a high-tech science. Paraphrasing Prussian General Carl von Clausewitz, Prof. Packer said diplomacy is the continuation of war by other means. Conflict may not be resolved, but it can be addressed without organized violence. The kind of diplomacy Prof. Packer focused on was noncoercive diplomacy, which he defined as "certain ways of talking, forms of dialogue that entail more than comprehension, more than data, but also understanding." The goal, he continued, was to transform a relationship between parties so they see each other not just as dehumanized competitors or threats, but as people in whom they can see themselves.

Preventive diplomacy almost always requires intermediaries, third parties who specifically facilitate or assist in preventing or resolving disputes. There are usually more than two disputants, and disputants are rarely entirely coherent or consistent in their positions. There may also be fourth-party actors who are not active in the dispute but who have interests in the situation. They can be very influential. An example of a fourth party actor might be an oil company interested in the situation in Sudan. Fifth parties might not be interested in the dispute

per se, but in enhancing their prestige; they too can be influential. Situations vary in complexity, but none is simple. In Darfur, for example, there are as many as 28 disputing parties, Prof. Packer said, and more than a few third-party intermediaries together with numerous interested fourth-party actors.

Having worked in extremely poor, underdeveloped areas, such as the Central African Republic, and in fairly developed, resource-rich areas with totalitarian regimes, such as Iraq, Prof. Packer said there is no "golden rule" or panacea with regard to approaches or communications, although ICT can be helpful in some ways. In principle, more and better communications are always desirable. Challenges to using ICT include the complexities mentioned above, questions about physical access, proximity, contact, and meetings (e.g., are they open or closed).

The communications themselves may have limitations (e.g., the extent of their reach, who can hear or listen, time zones, and differences in language). Then there are risks, such as the risk of location tracking. In 1996, in Chechnya, for example, President Dzhokhar Dudayev was targeted for assassination by Russian laser-guided missiles through a trace on his cell phone signal. There are also problems about the content of communications, issues of anonymity, and timeliness. Better technology can present dilemmas: for example, while authenticity and directness of contacts may be important to create confidence and the capacity to record may be important for some purposes (such as precision, reliability and memory), these same qualities can dissuade use for fear of parties being exactly identified and held to statements, etc. On the other hand, parties might welcome the opportunity to "fly a kite" (i.e., test an idea, proposal, or possible position) and yet they may wish or need to dissociate themselves from the same. In general, existing ICT tools, such as mobile phones, satellite dishes, Skype, Google Earth, and others, may be useful but also entail risks.

In conclusion, he said, peace negotiations often fail because of poor communication and poor understanding. ICT can help provide better communications and understandings in terms of quality, quantity, and timeliness. This can include access to information about options in the world, best practices, lessons learned, etc.; knowledge about others (real positions versus purported positions); real-time and secure contacts despite difficult geography; and so on. All of this can contribute significantly to more effective preventive and crisis diplomacy through accurate, substantive, reliable and timely information which will enhance credibility among parties. But ICTs cannot entirely replace relationship building and dialogue in establishing confidence and trust between parties.

Finally, communications technologies cannot respond to the new kinds of threats that have arisen, such as irrational or nihilistic parties, terrorists whose only goal is destruction of enemies and who reject all compromises out of hand. In the face of those threats, Prof. Packer said, he is "not confident that technology can respond to the challenge."

Strategic Gaming for Civil Resistance

Peter Ackerman is founding chair of the International Center on Non-Violent Conflict (ICNC) and coauthor of *A Force More Powerful: A Century of Nonviolent Conflict* (Palgrave/St. Martin's Press, 2001). Dr. Ackerman provided background information on nonviolent conflict, nonviolent resistance, and civil resistance, all common terms to describe how people living under authoritarian rule might respond when their rights, personal property, fundamental values, and sometimes their lives are threatened and they have no military option for fighting back. Nonviolent civil resistance, which can include strikes, boycotts, and mass protests, can be very disruptive even though they are nonviolent tactics, and can lead to regime transformation.

He explained the difference between nonviolent resistance and nonviolence. The latter is an ethical term for personal values that does not address trying to force authoritarians to change or leave power. In addition, nonviolent resistance should not be confused with conflict resolution or conflict prevention. It is a method of conflict management. Of the 67 transitions to democracy he analyzed in another book he coauthored, *Strategic Nonviolent Conflict: The Dynamics of People Power in the Twentieth Century* (Praeger, 1994), only 17 were achieved through discussion and negotiation, he said. The other 50, he said, involved significant civic disruptions that eventually forced the change.

Dr. Ackerman said the thesis of *Strategic Nonviolent Conflict* is that "circumstances are much less important than the quality of the strategic decision making of the opposition." Working with Steve York, a documentary film producer, Dr. Ackerman produced three documentaries showing many examples of effective civil resistance, such as the independence movement in India led by Mahatma Gandhi, the national lunch counter boycott during the civil rights movement in the United States, the Danish resistance to the Nazis, the anti-Pinochet movement in Chile, and the Solidarity movement in Poland. Two further documentaries tell of the resistance to Serbia's Slobodan Milošević ("Bringing Down a Dictator") and the civil disruptions in response to a fraudulent election in Ukraine in 2004 ("The Orange Revolution").

All of the documentaries show how nonviolent resistance has successfully upset the order of things and caused authoritarian rulers to lose control of their power bases. The films have been so successful that they have been translated into ten languages and shown in 70 countries. Opposition groups from around the world have contacted ICNC asking for training to develop their own strategies for nonviolent resistance tactics.

A successful opposition movement must have a strategic theory, Dr. Ackerman said, and his organization now provides a forum for "training" that involves sharing experiences and helping to develop strategic decision-making tools. The basic principle is for an opposition group to find weaknesses in the pillars of authoritarian support (e.g., ethnic groups, the bureaucracy, economic institutions, security services, police, military) and find ways to further weaken them. In the Philippines, for example, the People Power Movement was able to increase defections in the military and eventually bring down the government. Civic disruption based on strikes, boycotts,

mass protests, and public ridicule are designed to unify disparate groups and exploit weaknesses in the authoritarian power base, ultimately destabilizing the people at the top.

Ivan Marovic, a student leader of Otpor, the anti-Milošević movement in Serbia and a colleague of Dr. Ackerman, demonstrated a PC-based simulation game he created while working at ICNC. The game, "A Force More Powerful," is a pedagogical tool for assisting nonviolent opposition groups. "The game, like all simulations, is a medium that enables people to teach themselves," Mr. Marovic said. Players make their own stories and then draw certain conclusions from them.

The game provides 10 predesigned scenarios, ranging from a movement fighting a dictatorship or military junta to a backsliding democracy to opposition to an occupation and a movement for self-determination. The scenarios include demographics and geographic information. The game also has a scenario editor, a tool that enables players to create their own scenarios. All of them are nonviolent, but they all have lots of violence in them.

Players act within a scenario, first analyzing their opponents, and then sequencing tactics, such as boycotts, strikes, street protests, and so on to maximize their results and minimize their risks. Tactics can include harassing officials, denying resources to the regime, conducting noncooperation campaigns, initiating recruiting drives, and communicating with the general public to win over pillars of support, but also winning over the general public. The player plays against the computer, which controls the regime, which is programmed to be able to spot when something goes wrong and try to respond and suppress the activity.

Mr. Marovic emphasized that the game itself is less important than the pedagogical uses of the game, which enables people to scale it to their needs and also to gain a sense of control in an extremely complex and disorienting situation. The variables can be almost infinite, but the game enables players to try different sequences of tactics and see how they work. In this way, it enables users to identify the critical elements of success. For example, it may teach people that they have to ally themselves with others who are resistant to the regime, even if they are in conflict with them on a different level.

Discussion

A member of the audience asked how the game, which is "a controlled application of conflict," is related to peace. The benefit, he said, would be if an opposition group is organized to create the elements of a civil society that can govern through democratic, nonviolent means.

Dr. Ackerman responded that ICNC is currently engaged with a group that had been determined to start a violent insurgency but is now beginning to question its assumptions. Another member of the audience said that her group had found that nonviolent resistance is a key prevention strategy that can open a path to nonviolent transition from one regime to another.

Peacekeeping and Post-Conflict Peacebuilding

Nicholas Von Ruben is a senior programme officer in the Department of Field Support at the United Nations. Mr. von Ruben has spent years heading peacekeeping operations in Sudan, Democratic Republic of Congo, and other conflict zones. His talk was "not about how we use technology, but about challenges for which technology could probably help."

He began with a brief history of peacekeeping. In the past, he said, peacekeeping meant putting a military force between two parties that had been at war and monitoring the ceasefire. Today peacekeeping forces include peacebuilding components, such as police and civil units. In addition, the number of peacekeeping operations has increased dramatically; five new missions have been launched in the past 18 months. Five years ago, he said, 51,000 UN personnel were deployed in the field. Today there are about 140,000, the second largest deployed force in the world.

Peackekeeping forces are often stuck between open conflict and a ceasefire, as they are in Darfur, where fighting continues even as discussions are under way with various factions. However, these factions are constantly mutating and changing, which makes conflict resolution, or even a reliable ceasefire, difficult to achieve. For effective peacekeeping there must be "a peace to keep."

Serious problems often arise when peacekeepers are pulled out of an area. There must be a better transition, he said, between peacekeeping and peacebuilding, the period during which community and infrastructure for the future are developed.

UN peacekeepers are only sent into a situation if a Security Council resolution has been adopted. Resolutions usually include a mandate for a general ceasefire; the monitoring and redeployment of forces; the monitoring of the movement of armed groups; the disarmament, demobilization, and reintegration of ex-combatants; the return and reintegration of refugees from outside the country and of internally displaced people; the establishment of human rights and civil protections; the restructuring of a police force (which requires a solid, independent judiciary); de-mining; the mounting of public information campaigns; and, finally, elections.

Mr. Von Ruben then described operational challenges that could be better addressed with technology. First, technology, or "force enablers," might be able to make a peacekeeping force "look bigger." This would reinforce their presence and their credibility. Next, technology that would give peacekeepers precision vision, drones or other "eyes," for example, would greatly increase their freedom of movement. Peacekeepers also need better visibility in extreme weather conditions, such as sandstorms and thunderstorms. "In these conditions," he said, "you need to have visibility, and you need to be mobile." In addition, technology would obviously be useful for mine detection.

Technology that could help peacekeepers better organize and share information would be extremely beneficial. The key is to gather information from various sources, synthesize it, and weed out what is unimportant. Technology that could help with the gathering and synthesis of data on political, military, social, and humanitarian activities would enable peacekeepers to identify patterns that indicate trouble.

He then turned to some logistics challenges. Peacekeepers must be able to communicate with groups of people, including refugees that are often on the move. Therefore, peacekeepers must be able to track and locate them. He suggested that, perhaps, their animals might be tagged with radio frequency identification chips so their movements could be followed, and so people could be kept from wandering into conflict zones. In addition, technology to help in the tracking of the flow of arms and illicit trade in natural resources would be a great help.

Members of peacekeeping forces come from all over the world, bringing different types of equipment and communications technology. Technologies that would enable them to speak to each other in difficult environments would be invaluable. Communications technologies could also help to overcome language barriers between peacekeepers and the people they work with and are there to protect.

Detecting and managing water supplies in an area like Darfur would be a great boon to peacekeepers. Mr. Von Ruben mentioned recent work by Dr. Farouk El-Baz at Boston University, who believes he has found a large aquifer in northern Darfur. Adequate water supplies, Von Ruben said, might go a long way toward changing the dynamics of the conflict there. Finally, peacekeepers need to rely on energy from sources other than fossil fuels, which can be expensive and dangerous to transport and stockpile, and improve the way they manage and dispose of waste.

Comments by Respondents

Respondent 1: Alan Kay

Alan Kay is president of Viewpoints Research Institute. Dr. Kay presented a completely different perspective on how technology can be used to promote peace (see Appendix D for a written statement prepared by Dr. Kay). First, he said, we must accept human beings for what they are—creatures that use technology to make war *and* to make peace. However, along the way, some human beings have learned that economic comfort and substitutes for naked power are better at deterring war than philosophical arguments. "Bribing people with comfort," he said, is a good initial strategy for peacemaking. However, we also need a long-term strategy to change the way people think through education, and for that we need to use the printed word, which is much more efficient than the spoken word used by indigenous peoples and people who are illiterate. "You can say things in print that are almost impossible to say orally."

As Henry David Thoreau said, "We become the tools of our tools," in this case the medium of the printed word. And as Marshall McLuhan said, "We shape tools, and then they reshape us." Thus the printed word, a very powerful tool, can change people. Learning to read and write is difficult, but "the difficulty is what's important about it." Once people become literate, he said, they think qualitatively differently from nonliterate, oral people." He then referred to a conversation between Thomas Jefferson and James Madison, in which Jefferson said that the people are the ultimate repository of power. "If their discretion be not well enough informed to do this, the answer is not to remove their powers, but to better inform their discretion through education."

Communications media, be they printed words or cell phones, are not neutral to ideas and thought, and we must be wary of introducing media that do not advance non-oral thinking. "A seemingly innocent technological benefit—such as using mobile telephones to provide needed and useful information, or encouraging television as 'an information technology that doesn't need to be learned'—could derail the larger needs of a society to learn to think non-orally." Dr. Kay said he believes that the cell phone culture and Internet Web culture that have sprung up are simply reflections of pop culture, which, in turn, is a reflection of built-in human impulses rather than what we have learned.

Math and science, he said, are another order of thinking based on the difficult premise that "the world is not as it seems." Only literate people, he argued, are capable of moving beyond the usual epistemology and understanding this scientific view. Science, he said, tries to get around the poor thinking processes built into our brains and lead us to think in very different ways with very different perspectives on the world. But, he reiterated, first people must become literate. The question is how we can achieve this quickly on a very large scale.

Inexpensive printed books enabled people to learn individually, "away from society," and develop their own thoughts. If we could provide "a teacher for every learner" in the form of an inexpensive computer (the $100 laptop) that can teach children to read and write in their indigenous languages, or even help them learn "real science and math," we would have crossed a critical threshold. In fact, he said, the only way to provide enough teachers is to use computers, which are easy to manufacture and can be produced in great numbers very quickly. But for 50 years, he said, computer scientists have tried and failed to make a computer that can teach at least as well as a poor teacher.

Computer-based teaching must necessarily start with stories, which are built into human minds, and move toward the non-story thinking of math and science. In addition, these computers can hold hundreds of books. At the very least, he said, "this would be a way of publishing books for the entire world at a cost of 20 cents per book." Computer "teachers" would "qualitatively change the world by qualitatively changing how education happens."

He concluded that he believes that there are technological solutions to some of the big problems facing society, but only if people are willing to think about the larger picture that includes human beings as they are, "anthropology without apologies."

Respondent 2: Nigel Snoad

Nigel Snoad is lead capabilities researcher with Microsoft Humanitarian Systems, which is currently running pilot projects in collaboration with various humanitarian agencies in Afghanistan and other locations. For several years, Dr. Snoad worked for the United Nations in disaster management. He noted that one clear step for peacebuilding is to improve the governance of states and institutions, which not only promotes stability but also provides people with options for the future. One component of good governance is the existence of mechanisms to prevent those with power from taking advantage of those with no power. This is extremely difficult to achieve in the midst of conflict.

Good governance requires accountability, which can mean legal checks and balances, but it can also be achieved in other ways. Accountability requires building institutions, increasing transparency, and reducing corruption. For example, he said, he had been told about a contractor who was supposed to build a school in Afghanistan who received $50,000 for the project, even though $2 million had been provided originally and everyone in the local community knew that a school should cost about $100,000. This gap, which erodes trust and confidence on every level, can start to be tackled by increased transparency and accountability, and technology can play a role. "Technology in the service of good governance can enhance the social forces that generate trust," he said.

He then commented on to the role of technology in diplomacy, negotiation, and reconciliation. Noting that he was not an expert in this area, he said he felt that using simulations to design storytelling and storytelling support mechanisms seems to be a very positive use for technology. British Gen. Rupert Smith has repeatedly said that modern conflicts are about who wins this storytelling contest, noted Dr. Snoad. The question is how to build trust and a vision for what is possible in society, so that people can decide they want to go along with this (non-violent) model of society rather than launching into violent conflict.

An audience member interrupted to say he thought this was not a good way to accomplish this goal. Dr. Snoad agreed that it was not ideal, but in the midst of a conflict, he said, it may be all that can be done. "You document what is happening, you alleviate suffering, you hope you are not falling into conflict, though often you are, and you try to use storytelling that leads to a solution."

Technology plays a critical role in improving humanitarian response to those affected by conflict. Situational awareness tools can be used to help coordinate action to alleviate the suffering of those who are affected by violence, who usually have no voice or mechanism for participating in events. In general, he said, alleviating suffering is a critical first step for people to choose a nonviolent way of satisfying their needs.

Technology can also be used to document abuses and "for preserving stories for later justice." In the midst of a violent conflict, justice may be delayed. But preserving stories, even conflicting stories, gives people a voice for the future.

Dr. Snoad then turned to the questions that had been raised about the use of mobile phones and PC technologies. "These tools are going to be used" in conflict situations, he said, "whether we like it or not. So we need to think about how we can harness them to encourage our better natures rather than our baser instincts." Many current humanitarian coordination mechanisms are based on command and control mechanisms that do not fit well with user empowerment, social networking, and the wisdom of crowds that new technologies enable. This can create significant opportunities for those attempting to coordinate humanitarian assistance or enact social methods of peacebuilding.

Finally, he noted the problem of "the democratization of the gun." (A point that had been raised earlier.) He recounted how, when he was in Iraq, AK-47's were being sold for around $50. Guns, he said, clearly give individuals and small groups a means of radically affecting

violence in local areas, even neighborhoods. This is not a new problem, but dealing with this situation is completely different from dealing with conflicts between states. "The influence of guns," he said, "can only be countered by the democratization of some other kind of influence. This involves communications, storytelling, monitoring, and negotiating."

Respondent 3: Steve Wozniak

Steve Wozniak is executive vice president, chief technology officer, and chief visionary officer of Jazz Technologies, Inc. Mr. Wozniak began by pointing out that conflicts are ubiquitous. People have different ideas and different ways of understanding things, which often lead to disagreements. If two people disagree, they can fairly easily decide not to come to blows; they can agree to disagree. This is more difficult with groups of people, however, especially groups with long-standing disagreements that have led individuals in one group to demonize or dehumanize individuals in the other group.

Technology can break through the barriers between individuals. During the cold war, he said, he was able to talk to people in the Soviet Union through a GTE phone connection, what he called a "space bridge." At some point during or after his conversations, he suddenly realized, he said, that "these people are like us. It is our governments, the people who represent us, who have led us to believe they are all to be feared." However, he and his family were vilified for talking to the enemy.

Technology amplifies our desires, whether they are good or bad. Perhaps, he mused, children are being taught the wrong things in school. For example, they are taught that some wars are good, so they may think the next war might be their chance to make the world better. "We haven't taken one step to make sure there won't be another Iraq in 30 years," he said, or to encourage kids "to come up with better ways to resolve conflicts." Education is essential to peace, and technology can help. But technology can only take us so far, he said. Some computer games that teach nonviolence might carry over to kids, he said, but we must stop teaching them that wars can be good.

He then returned to the computer teacher described by Dr. Kay. Based on his experience as a teacher, he said, he had concluded that we will never be able to build a machine that can teach as well as a teacher. "How can you make a computer equal to a human being?" he asked. However, he went on, supplying low-cost phones to people is useful, and despite its limitations, the "one laptop per child" idea is a constructive way to put ICT in people's hands "that is going to make them start thinking more deeply about technology, jobs, and moving their countries up the right economic ladder. . . . Besides, technology can give people something to do besides fight."

Discussion

A member of the audience opened the discussion with a description of good governance. "Good governance," he said, "often depends on the destruction of bad governance and whether you have the power to destroy it." It isn't a question of money, he said, but of how power is used

for change. He went on to talk about nonviolent conflict. Most leaders of nonviolent movements, such as civil resistance movements, would have used violence if it had been an option. They chose a nonviolent path, he said, not because their situation had eased but because it had become more desperate. He cited the Solidarity movement in Poland as an example. After the failure of the uprising in Warsaw in 1970, the opposition turned to Solidarity, which was a nonviolent way of "eliminating the significance of government for people, thus undermining government structures." Another example, the civics movements in South Africa, was a direct result of the failure of armed struggle. With more than 600 civics movements, the people undertook boycotts and other economic measures that destroyed the basis for trade for many white South Africans. They, in turn, pressured the political powers to release Nelson Mandela.

Technology can provide ways for people to communicate, without the risk of betrayal, and to signal each other that they are on the same side. "The power of civic disruption is in the ability of key elements in the military and other support groups of the dictatorship to identify each other and join forces to resist. He then described how in Chile, after a failed strike in a copper mine, the resistance realized that the reasons for failure were that the area was too small and was easily surrounded by the military. So they tried a different tack. They instructed the population of Santiago to do everything—walking, driving, and working, and so on—at half speed and to open their windows at night and make a racket by banging on pots and pans. People did this month after month, and, in the process, they discovered a "pent-up potential for resistance." More aggressive tactics followed until President Pinochet miscalculated and called for a referendum, which he ultimately lost. When he then looked to the military to keep him in power, they refused to do so. "The courage to do this depended on self-identification."

DISCUSSION ABOUT NEXT STEPS

Patricia Thomson, executive vice president of USIP, opened the discussion with a few general remarks. Everyone agrees, she said, that ultimately peacebuilding is about people, not technology. But "technology enablers and tools can facilitate solutions to many problems." She then listed significant challenges to peace for the next decade based on the background document developed by USIP (Appendix E):

- Environmental degradation and climate change
- Weapons of mass destruction
- Weak economies, fragile states, and undemocratic states
- Weak international institutions and the lack of will to act in the face of atrocities
- Clashes of civilizations and ideologies
- Growing numbers of disenfranchised people, widening gaps between rich and poor, and the radicalization and empowerment of disenfranchised and alienated groups
- The movement of large numbers of people, either refugees or emigrants (legal and illegal)
- Perverse effects of globalization, such as local problems that cascade into catastrophic problems (e.g., pandemics), and the growing awareness of inequities or other grievances that prompt disenfranchised groups to take action, sometimes violent action

Discussion moderator Vinton Cerf, Google, Inc., asked the group to consider technologies that could help address any of these issues, particularly global warming and ensuring supplies of fresh water. Global warming has the potential to cause crop failures, which could lead to inadequate food supplies, and sea level rise, which could lead to dislocations of large numbers of people.

Another participant then took up the theme. He described some ways that technology and science have reduced the likelihood of conflict by removing the causes. "A lot of good things have happened over the last few years," he said, "as a result of science trying to improve the availability of food, increase crop yields, and so on. In addition, refrigeration has improved the food supply by extending food preservation time."

Another member of the group said that removing the economic reasons for conflict can help, but should not be overstated. Contrary to popular belief, he said, eliminating poverty would not eliminate conflict. In fact, "poor starving masses" do not rise up, he said, because they are preoccupied with efforts simply to survive. Conflicts arise when wealth is created and people's capacities improve. That is when competition increases. Thus "rising wealth contributes to conflict creation or generation to some degree." Besides competition for limited space and resources, there is also competition over prestige and power, which cannot be resolved by addressing the resource problems, he said.

Information and communications technologies can help, though. For example, when the hotline, a simple telephone connection, was established between the White House and the Kremlin, it reduced the risk of nuclear war. We should invest in ways to cooperate, he said. Instead of teaching about competition (e.g., eliminate the enemy, diminish the capacities of the competitor), we should teach constructive cooperation, the skills and habits of teamwork.

Finally, he said, we must find a way to promote "wisdom and judgment," which come from experience, but also "have to do with social psychology, confidence, and being able to measure risks in the face of others with opposing views." This would also contribute to good governance and leadership.

Dr. Cerf said that "in places where people believe there isn't enough of what they need [food, water, space, and so on] for everyone, they feel compelled to 'get theirs first' in order to survive. A technology that could let people know when there is enough for everyone would reduce fears and eliminate some conflicts."

Another participant referred to the simulation game, A Force More Powerful, which teaches nonviolent resistance. He said that conflicts are inherent in human nature, so training, rather than education, might show people that there are options other than violence for reacting to a conflict. They might learn "how to trick the other person into giving them what they want or directing him or her in another way." He said Internet Web 2.0 technologies enable people to communicate and describe their experiences, which might influence how people in similar situations respond. "If our assumption is correct that more people are good than bad, we are on the right road," he said.

One workshop attendee agreed that education is a "nice, long-term strategy" for preventing conflicts. But, he said, a combination of social modeling and sensing would be beneficial for spotting the early signs of potential conflicts, "some underlying process that no one noticed," and heading off the conflict altogether. A series of models could be developed, he said, for different regions of the world, moments in time, or global events and situations that might be ripe for disruption by environmental change, and so on. Using all emerging technologies, he continued, and having one entity, such as the UN or an NGO or a group of NGOs, put the modeling process, cataloguing, sensing, and so forth together would enable people from all over to participate and contribute, would begin to build "a distributed community for spotting trouble in the early stages before things blow up."

Dr. Cerf then summed up the discussion thus far. Two technologies, he said, seem to be fundamental—communication technologies in the broadest sense and technologies for predictive analysis and modeling—including models of climate, water resources, and people's behaviors. There are two trains of thought in the workshop group. One is for long-term education and changing social values over time. The other is for building peace and mitigating the consequences of violence in specific locations where violent conflict continues or has just ended.

The discussion continued with an attempt to describe the things that *can* be done, rather than *should* be done. The next speaker said we cannot and should not eliminate conflict altogether, but rather create tools for minimizing the negative aspects of conflict. He reminded the group that "we want conflict when it creates positive social change." The workshop, he said, should focus on "definable, 'bracketable' problems" and ways to get involved early to minimize the negative consequences of violence.

Several people then discussed technologies that could be used to improve education in populations traumatized by violence, such as technologies that enable people, particularly women, to learn on their own, outside of the school setting. Someone interjected a reminder that technologies become widely distributed only if commercial interests can also be satisfied. "Sustainability requires a self-interested commercial market," he said, "and businesses will only become involved if they see that long-term investment in peacebuilding will pay off." Another person suggested that the group might investigate ways to mobilize companies to address "the very specific, sometimes strategic, often tactical challenges that peacekeepers face in the field."

One participant then described the satisfaction he had experienced after building a village well that met a community's needs. By cooperating with members of the community in the planning, location, and building of the well, he said, he not only helped to build a well, but also imparted political and economic power to this community. "There are consequences to digging wells, building bus stations, roads, and so on, and changing one variable can affect all of the others," he said. But he also acknowledged that "doing one thing is easy, but doing the trillion things that have to be done is much more difficult."

The "meta issue," another speaker said, "is how this workshop group can continue to keep these ideas in the public mind, identify entrepreneurs and others who could contribute to solutions, and establish economic bounds so the issues become tractable." Engineers, he said, do the easy part, such as the actual design and building of technology. The hard part is figuring out

how to keep the process going. This group might become a clearinghouse for nonprofits, academics, the military, and for-profit companies, he said, "to present problems in ways that address the real interests and concerns of these 'customers.'" Another said that many large communications technology firms just have to be asked to participate in these projects. All of them, he said, have "global initiatives."

FINAL COMMENTS

Workshop steering committee Chair Jack Gibbons and USIP President Richard Solomon closed the workshop with brief final comments.

Dr. Gibbons noted that we are living in "extraordinary times" when the agglomeration of power in individual nation states is now competing with the influence of non-state terrorists, such as Osama bin Laden. People like bin Laden "don't have . . . to worry about the preservation of an institution, because they don't have one."

This shift is occurring at the same time we are coping with increasing pressure on global natural resources, environmental change, species loss, and population growth and crowding. For example, in some countries in the Middle East, half the population is under age 15. Many of these young people see no jobs or future for themselves and are open to the appeals of terrorist groups.

"What are the imperatives for us?" he asked. One is to develop better analytical capabilities that can anticipate the combined effects of various population, economic, and climatic stressors. Being able to track "demographic transitions," for example, and determine where impacts will be felt is "doable." Another important need, continued Dr. Gibbons, is to explore opportunities for designing information and communications technologies that are more resilient to misuse.

Ultimately, he said, the United States, other Western cultures, and fast-growing nations like China will need to move away from "the almost ubiquitous model of exponentiation as a means to a desired future." It is simply not possible, Dr. Gibbons asserted, to have sustainable growth while maintaining current levels of resource consumption.

Dr. Solomon touched on a number of points raised during the workshop that he felt were important. He first noted that conflict at one level is "basically a communication issue." He pointed out that when two countries are going to go to war, they withdraw their ambassadors. Once the conflict is under way, they "desperately search for a way of reestablishing communication." He reminded the group of Irwin Jacobs' comments about the increasing power of the cell phone. "[H]ow could we use that capacity . . . to deal with issues of conflict management?"

Dr. Solomon noted that most of USIP's programming is not dependent on the purchase or use of expensive technology, rather it is made possible by the work of "creative people." At the same time, he added, it is clear "that technology could be a very effective enabler of strategies of conflict management." He expressed the hope that follow-on activities to the workshop would

explore with greater focus what existing and emerging technologies can contribute toward this goal. "We want to follow through and figure out the way to build on this effort."

Appendix A

Workshop Agenda

Workshop on the Use of ICT in Peacebuilding

National Academy of Engineering

December 14, 2007

Beckman Center
Irvine, CA

Final Draft Agenda

7:30 a.m.	Breakfast
8:00 a.m.	Welcome and Introductions *Jack Gibbons, Resource Strategies, Steering Committee Chair*
8:30 a.m.	Conflict in the 21st Century *Richard Solomon, U.S. Institute of Peace*
9:15 a.m.	Panel 1: ICT in the Cause of Peace *Moderator: Vint Cerf, Google, Inc., Steering Committee*
	The Use of Mobile Phones in Election Monitoring *Chris Spence, National Democratic Institute for International Affairs*
	GIS and Participatory 3-D Modeling in Land-Use Negotiation *Giacomo Rambaldi, Technical Centre for Agricultural and Rural Cooperation, Wageningen, The Netherlands*
	What role for civil society and ICT in peacebuilding? *Sanjana Hattotuwa, InfoShare (via Skype)*
10:15 a.m.	BREAK
10:30 a.m.	Respondents

Irwin Jacobs, Qualcomm
Deborah Estrin, UCLA
Bran Ferren, Applied Minds

11:00 a.m. General Discussion
Moderator: Jack Gibbons, Resource Strategies, Steering Committee Chair

11:15 a.m. Panel 2: In the Field: Challenges and Opportunities
Moderator: Patricia Thomson, USIP, Steering Committee

Preventive and Crisis Diplomacy
John Packer, Human Rights Centre, University of Essex (by videoconference)

Strategic Gaming for Civil Resistance
Peter Ackerman and Ivan Marovic, International Center on Nonviolent Conflict

Peacekeeping and Post-Conflict Peacebuilding
Nicholas Von Ruben, United Nations

12:15 p.m. Respondents
Alan Kay, Viewpoints Research Institute
Nigel Snoad, Microsoft
Steve Wozniak, Jazz Technologies, Inc.

12:45 p.m. LUNCH and Informal Discussion
Attendees

1:45 p.m. Discussion re Next Steps, Opportunities for Collaboration
Moderator: Vint Cerf, Google Inc., Steering Committee

2:45 p.m. Final Comments
Jack Gibbons, Resource Strategies, Steering Committee Chair

3:00 p.m. ADJOURN

Appendix B

Attendee List
NAE Workshop on the Use of ICT in Peacebuilding

NAE Steering Committee

John H. (Jack) Gibbons*
(Former Assistant to the President for Science and Technology and Former Director, OSTP)
President
Resource Strategies

Vinton G. Cerf*
Chief Internet Evangelist
Google, Inc.

Jane Holl Lute *(not attending)*
Assistant Secretary-General
Department of Peacekeeping Operations
United Nations

Raj Reddy* *(not attending)*
Mozah Bint Nasser University Professor of Computer Science and Robotics
Carnegie Mellon University

Patricia Powers Thomson
Executive Vice President
U.S. Institute of Peace

Speakers

Peter Ackerman
Founding Chair
International Center on Nonviolent Conflict

Sanjana Hattotuwa**
Head, ICT and Peacebuilding, InfoShare and Special Advisor, ICT4Peace Foundation

Ivan Marovic
Consultant

John Packer***
Professor of International Law and Director of the Human Rights Centre
University of Essex

Giacomo Rambaldi
Senior Programme Coordinator
Technical Centre for Agricultural and Rural Co-operation ACP-EU

Richard Solomon
President
U.S. Institute of Peace

Chris Spence
Director, Technology Strategy and Programs
National Democratic Institute for International Affairs

* Member of the NAE
** Attended via Skype
*** Attended via videoconference

Nicholas Von Ruben
Chief
Integrated Support Services
United Nations

Confirmed Guests

Dale Burton*
Vice President Technology and CTO
Integrated Systems
Northrop Grumman Corp.

Peter Cherry*
Chief Analyst
SAIC

Derrick Cogburn
Assistant Professor of Information
School of Information Studies
Syracuse University
Director of the Center for Research on Collaboratories and Technology Enhanced Learning Communities

Craig Collins *(not attending)*
Coordinator
Initiative on Conflict Prevention through Quiet Diplomacy
Human Rights Internet

Deborah Estrin
Professor
Computer Science
University of California, Los Angeles

Bran Ferren
Co-Chairman and Chief Creative Officer
Applied Minds

Michael Hawley
Director of Special Projects
Go Expeditions
Massachusetts Institute of Technology

Irwin Jacobs*
Chairman
QUALCOMM, Inc.

Alan Kay*
President
Viewpoints Research Institute, Inc.

Patrick Meier
Fletcher School of Law and Diplomacy
Tufts University
Harvard Humanitarian Initiative

William "Bill" Nash
Adjunct Senior Fellow for Conflict Prevention and Director, Military Fellows Program
Council on Foreign Relations

Colin Rule
Director of Online Dispute Resolution
eBay and PayPal

Nigel Snoad
Lead Capabilities Researcher
Microsoft Humanitarian Systems

Daniel Stauffacher (*not attending***)**
Chairman
ICT4Peace Foundation

Horacio Trujillo
Director of Research
Humanity United

Eli Turk
Chairman of the Board
Human Rights Internet

Steve Wozniak*
Executive Vice President
Jazz Technologies, Inc.

* Member of the NAE

U.S. Institute of Peace Staff

Robin Gibbin
Contractor

NAE Staff

Proctor Reid
Director, Program Office
National Academy of Engineering

Greg Pearson
Senior Program Officer
National Academy of Engineering

Jacqueline Martin
Senior Awards Assistant
National Academy of Engineering

Antwuan Wallace
Science and Technology Policy Fellow
Engineering Ethics Center
National Academy of Engineering

Appendix C

Terms of Reference

The Use of ICT in Peacemaking

National Academy of Engineering

Terms of Reference

January 2007

Summary: The National Academy of Engineering (NAE) proposes to convene a group of experts in diverse fields to consider the role of information and communication technology (ICT) in promoting peace and conflict resolution. The full-day workshop will consider current and emerging technologies and strategies for employing them in conflict management and diplomacy. It will also explore how organizations with a role in promoting peace, like the U.S. Institute of Peace, can most effectively leverage ICT in carrying out their missions.

Background and Rationale: The United States Institute of Peace, the project's primary funder, is the only national organization with a Congressional mandate to help prevent and resolve violent international conflicts, promote post-conflict stability, and increase peace building capacity worldwide. The Institute's work is based on best practices and research. Its programs are both analytical and operational. Institute initiatives are currently active in Iraq, Afghanistan, the Sudan, the Niger Delta, the Balkans, Colombia, and Southeast Asia, among other regions. The Institute has asked the NAE to organize and convene a meeting that will facilitate the organization's efforts to more effectively use ICT in achieving its mission.

The project recognizes the potentially valuable role ICT can play in supporting international development and diplomacy, as well as the need for peacebuilding communities to work collaboratively with science and engineering communities. It leverages the reputation and convening powers of The National Academies, which have a long, distinguished history of examining issues at the nexus of science, technology and public policy for the betterment of humankind.

Objectives: The meeting will have two objectives:

1. To explore the application of existing and on-the-horizon ICT that can facilitate conflict management (i.e., conflict prevention, mediation, and resolution, as well as post-conflict operations) with greater efficiency and efficacy; and

2. To begin to develop an agenda for engaging other organizations in ICT-related conflict management and to explore the possibility of a sustained working group to continue to explore these issues.

Planning and Logistics: Meeting planning, including selection of attendees and specification of an agenda, will be overseen by a steering committee of approximately five individuals, including at least one NAE member, who will chair the group. One member of the steering committee will represent the interests of the U.S. Institute of Peace. The committee will conduct its work via telephone conference calls. The meeting will be held on the West Coast at a location convenient to the majority of attendees. An effort will be made to have the meeting space donated as in-kind support. The meeting will begin in the morning and adjourn mid-afternoon, allowing most travelers to arrive and depart on the same day. Invitees will be sent background information and questions to consider in advance of the meeting.

Possible Topics for Discussion: A number of discussion topics are possible, including

1. The use of ICT to extend and increase the impact of the education and training missions of peace-building organizations
2. The use of ICT to monitor and improve intelligence about potential and active conflicts
3. The use of ICT to improve communications in such areas as simultaneous translation, text categorization, and security
4. The use of ICT to support "virtual diplomacy" in zones of conflict

Attendees: A total of 10 to 15 individuals will be invited to the meeting. It is expected that persons with the following backgrounds will take part:

1. Academic and industrial engineers expert in a variety of sectors, including the ICT sector, simulation and modeling, and gaming
2. Individuals who think creatively about the future of technology and of technology-society interactions
3. Experts in diplomacy and conflict management/peace building
4. Representatives of foundations and government agencies with an interest in encouraging collaboration between the science and engineering communities and peacemaking organizations.

Appendix D

Statement by Alan Kay[2]

Technology and Peace?

People who like to make war are avid to use technology. And so are people who like to make peace. In the end, war and peace are really about "humans as they are," namely, "anthropology without apologies." Mutual economic comfort and various substitutes for naked power seem to be a better deterrent to war than philosophical arguments. This calls for "wealth," and most wealth-making since the invention of agriculture has come from scientific engineering, especially in the last 400 years after science was invented and started to guide engineering. As Bob Noyce[3] liked to say, "Scientists, Engineers and Artists create wealth, everyone else just moves it around!"

So "enticing" (a nicer word than bribing) people with comfort and ideas is likely a good initial strategy for peace making. For a country like the US that is very good at creating wealth (and its tangible projection in the form of money), this suggests that we should not wage war but instead "essentially buy out competitors" via goods and education. (This needs to go far beyond simple bribery, but it is startling to divide population counts into the amounts we spend for war-making. Most people are "bribable" for much less.) In the larger sense of "goods and education," we should put much more effort into stealthily re-educating the world (and, by the way, ourselves) rather than trying to force matters, and using "matters of force."

Technologies are part of "stealth education," because the *form* of a technology can have gradual effects not readily apparent in its initial invention and use. As McLuhan said, "We shape tools and then they reshape us." Earlier, Thoreau noted less approvingly: "We become the tools of our tools." A beautiful Amish saying is: "What you take into your hands, you take into your heart."

Sometimes this is beneficial. Anthropologists gradually discovered that literate cultures have qualitatively different thought patterns than oral cultures, and could only ascribe the difference to mental changes brought by gaining the skills of reading and writing, which gradually lead to new forms of exposition and argument. The printing press made a huge difference, not just by spreading ideas around, but by changing how people learned and thought, and in what terms. Another McLuhan gem: "You can argue about a lot of things with stained glass windows, but Democracy is not one of them!"

This point of view on the relations between media, knowledge and ways of thinking is as startling to most people as "the world is not as is seems" is to most non-scientists (in fact, it is part of "the world is not as it seems" as related to human beings). If media are not neutral to ideas and thought, we should be as careful with the invention and deployment of new media as we would with infectious biological agents with no vaccines. For example, we would be able to see that television is one of the most pernicious and dangerous mediums to introduce into society, since with almost no sense of loss it can displace media that can better carry important ideas. Many of the electronic communication devices of the last 150 years bring back oral communications modes and ways of thinking. This delivers "Air Guitar:" how to use lots of transistors without advancing anything important! This is what McLuhan feared when he predicted a "global village" and a return to tribal thinking and senses of identity, fear, and actions. And it is part of Thoreau's terse warning.

---

[2] *http://www.vpri.org/pdf/ACK-Pic-Bio-05-16-07.pdf.*

[3] The co-inventor of the integrated circuit and co-founder of Intel.

So, a seemingly innocent technological benefit—such as using mobile telephones to provide needed and useful information, or encouraging television as "an information technology that doesn't need to be learned"—could derail the larger needs of a society to learn to think non-orally. What if the very *difficulties* of learning to read and write are the *real benefits* when surmounted? What if the real difficulties of math, science and engineering are the real benefits when mastered?

Science is the most important of all of these because it represents humanity's strongest attempt at processes which try to get around the "poor thinking" built into our brains. It is not about just trying to think better, but to *learn to think in very different ways* about very different perspectives that are taken on the world. These powerful error-detecting and correcting processes are even more needed for the difficulties of political thinking than for the physical and biological worlds.

Good teachers are scarce everywhere in the world, and the situation is particularly acute in less-developed regions. Science's very different "the world is not as it seems" epistemology is difficult for most adults not brought up with this non-commonsense point of view (and thus this is not part of most teachers' world view). Developing better teachers, and enough more of them, is not easy or swift, even with will and resources.

What can technology do to help here? We know from the history of the printing press that much learning can be done through books without teachers if the learners can read for content. This was one of the main educational goals of the 19th century and early 20th century, but can hardly be found now. It is now possible to provide books (and more) on electronic devices for about 20 cents a book providing one is willing to purchase 500 books. This fits very well into the needs of K-8 education and can be thought of as access to many more than 500 books (and many other educational activities as well) for an amortized cost of about $10-$15 per year.

Given that the teaching and mentoring problem for non-obvious epistemologies is the largest part of improving education, the most interesting and important question is not how inexpensively can personal laptop computers be made to provide "books" and other "information" for the underprivileged, but whether the 50 year old question "can the computer be programmed to act better than no teacher and better than a poor teacher" be answered in the affirmative?

If so, then for the first time there exists a route to provide "a teacher for every learner," and it should be easy to see that that this is one of the "Grandest Challenges For Humanity" (and especially for the STEM fields).

One of the hardest, but most useful and important "teachers" to make that could act above the needed thresholds would be to create "a teacher" that can help most children learn to read and write in their indigenous language without needing any other special human assistance. Or to help children learn "real science" and "real math." One of the important intellectual transitions that have to be managed for children are those that necessarily start with stories (because they are strongly built into human minds) and move toward the "non-story" forms of math and science that have been so powerful. Another learning sequence moves through "muscular learning" by direct contact with the world through "configurational learning" (including visual and auditory figurations), and then to the more abstract world of symbolic representations.

Of course, it would be great to involve other members of family and society as much as possible, but this really needs to work for the learners alone if necessary.

This has been a dream in computing for more than 50 years now, and some of the best people in our field have failed to create above threshold systems (the several interesting exceptions have been brute force designs that are very expensive and time-consuming to produce).

However, if we are trying to do better than a poor teacher, and we are not trying to do as well as a great teacher, the computing resources and accumulated techniques today should be sufficient to make a

concerted effort and succeed. This would qualitatively change the world by qualitatively changing how education can happen and be delivered.

It would cost considerably less than a B2 bomber to pull off, and would have immeasurably more positive impact.

Appendix E[4]

Backgrounder on International Conflict

Overview

It is essential that the United States, working with the international community, play an active part in preventing, managing, and resolving threats to international peace. In the post-Cold War world, these threats are numerous. They include ethnic and religious strife, fragile and undemocratic states, weak economies and growing economic disparity, political extremism, competition for scarce resources, and the proliferation of weapons of mass destruction. The resulting suffering and destabilization of societies make effective forms of conflict management imperative. The United States Institute of Peace (USIP) is dedicated to meeting this challenge in new and innovative ways.

This backgrounder is intended as a high-level overview of the phases and drivers of conflict,[5] as well as the next decade's top threats to peace. More in depth resources can be found on the Institute's website (*http://www.usip.org*).

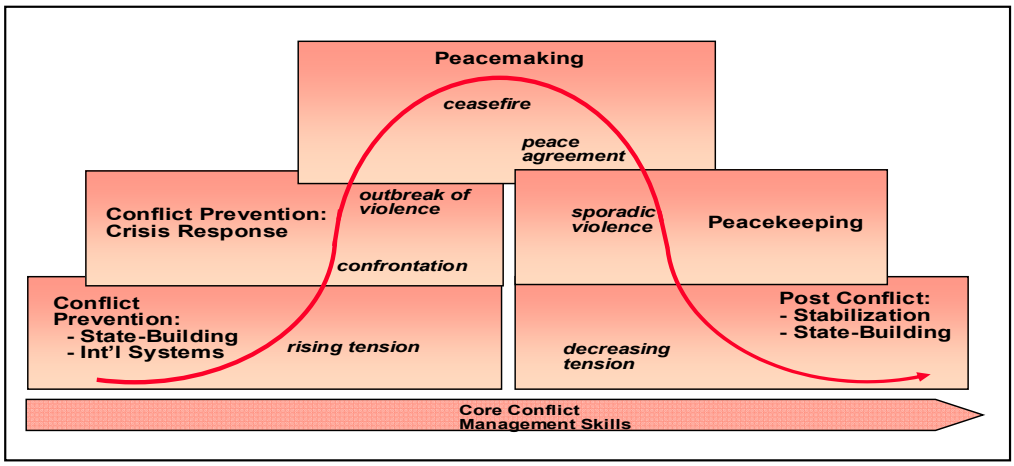
Conflict Fast Facts

- There are approximately 100 nascent, active, or post-conflict situations in the world today.
- In the 20th century, an average of 940,000 people died due to conflict ***every year***.
- Since the start of this century, an average of 2,738 people have been driven from their homes by conflict ***every day***.
- Over the past decade, 2 million children have been killed by armed conflict, 1 million orphaned, 6 million disabled, and 10 million impacted with severe psychological trauma.
- For every violent death in conflict, there are an estimated 10 "indirect deaths" due to war-exacerbated factors such as malnutrition.
- In 2006, 64.5% of the world's population felt the effects of armed conflict.
- Billions of dollars are invested annually to sustain warfare capacity. There is no comparable investment in *peacefare*.

I. Cycle of Conflict

The curve of conflict is a model that helps illustrate how conflicts tend to evolve over time. The curve below shows the different phases of conflict and corresponding types of third-party intervention. Understanding where a conflict falls in the cycle is essential to developing effective strategies for intervention, along with the timing of those strategies.

[4] Prepared by the U.S. Institute of Peace. Used with permission.
[5] Throughout this document the term "conflict" is used as shorthand for violent conflict.



II. Drivers of Conflict

Below is a summary of the extensive and frequently contentious literature on the drivers of large-scale political violence. These drivers have been divided into three categories: drivers of both intra- and inter-state conflict, drivers of intra-state conflict / civil wars, and drivers of inter-state conflict. It is important to note that the motivations of leaders and fighters can often be different, that conflicts often have multiple drivers, and that drivers change over time.

Drivers of Both Intra- and Inter-State Conflict:

- ***Competition among social groups/ideological differences*** are often cited as drivers of conflict, typically focusing on tendencies of people to align with tribal, ethnic, or religious groups and to make sharp in-group / out-group distinctions. Collier and colleagues, for instance, find that ethnic and linguistic diversity within a society is correlated with onset of civil wars.[6] Samuel Huntington's controversial argument that fault lines between civilizations will be a major source of conflict in the early 21st century also fits this general category at the global level.[7]

- Some have argued that ***competition for resources*** and ***greed*** contribute significantly to political violence. Thomas Homer-Dixon's research program has found that demographic and environmental stresses tend to promote civil violence. For example, Jared Diamond and others have argued that population density and resulting scarcity of arable land created conditions that led to the 1994 genocide in Rwanda.[8] More broadly, according to Michael Klare, "Historically, many wars have been fought over the possession or control of vital resources: water, arable land, gold and silver, diamonds, copper, petroleum, and so on."[9] This driver also manifests when parties or individuals engage in violence to enrich themselves.

[6] Paul Collier, Anke Hoeffler, and Dominic Rohner, *Beyond Greed and Grievance: Feasibility and Civil War*. CSAE WPS/2006-10 (August 2006). Available on-line at: *http://www.csae.ox.ac.uk/workingpapers/pdfs/2006-10text.pdf*.
[7] Samuel Huntington, *The Clash of Civilizations and the Remaking of World Order* (New York, NY: Simon & Schuster, 1998).
[8] Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed* (New York, NY: Viking Press, 2004).
[9] Michael Klare, "Resource Conflict," Compiled for the Peace and World Security Studies Program (PAWSS). Available on-line at: http://pawss.hampshire.edu/topics/resource/index.html.

- Other research suggests that ***militarization*** increases the risk of wars. Countries with high military expenditures relative to GDP are more likely to experience civil wars, but the direction of causality is uncertain. Researchers have likewise observed a correlation between arms races and war, but it is difficult to judge whether an arms race has an independent, causal effect on war.

Drivers of Intra-State / Civil Wars:

- Early research into civil wars focused on ***grievances*** that emanate from different group characteristics, ideology, or material conditions. On the latter, for instance, Ted Robert Gurr argues that: "The potential for collective violence varies strongly with the intensity and scope of relative deprivation among members of a collectivity."[10]
- However, grievances alone seldom lead to armed conflict. Much of the recent empirical work supports the centrality of ***feasibility***. A significant amount of this research concerns measures of rebel groups' ability to finance operations and recruit participants, and on the capacity of states to counter rebel movements effectively.[11]
- Researchers have also found elite struggles for power and resources can drive violent conflicts. Efforts by "bad leaders" to gain and consolidate power are associated with many of the most deadly internal and international conflicts. Underlying conditions affect the overall risk of conflict, but individual actions represent important proximate drivers of violence.[12]
- Researchers have noted the relationship between ***endowments of certain natural resources*** and civil wars. Recent studies have concluded that oil and diamond production are "robustly correlated with civil war onsets."[13,14] Other studies have suggested that heavy reliance on agriculture or exports of other primary commodities may increase risk of civil war, possibly through vulnerability to price shocks.[15]

- There is also evidence that the following social factors increase the likelihood of civil war (although they are not necessarily the underlying drivers):
    - High proportion of population who are males aged 15-29
    - High youth unemployment
    - Mountainous terrain (presumed to make it easier to organize guerilla campaigns)
    - Low per capita income
    - Low growth of per capita income

Drivers of Inter-State Wars:

- The dominant paradigm to explain major inter-state wars is the "realist" school of international relations. From the realist perspective, war results from the anarchic nature of the international

[10] Ted Robert Gurr, *Why Men Rebel* (Princeton, NJ: Princeton University Press, 1971), p. 24.
[11] For example, Fearon and Laitin hypothesize "that financially, organizationally, and politically weak central governments render insurgency more feasible and attractive due to weak local policing or inept and corrupt counterinsurgency practices." See James Fearon and David Laitin, "Ethnicity, Insurgency, and Civil War," *American Political Science Review*, Vol. 97, no. 1 (February 2003), pp. 75-6.
[12] Michael E. Brown, "The Causes and Regional Dimensions of Internal Conflict." In Michael E. Brown (Ed.), The International Dimensions of Internal Conflict (Cambridge, MA: MIT Press, 1996), pp. 571-602; Daniel L. Byman & Kenneth M. Pollack, "Let Us Now Praise Great Men." *International Security*, 25:4 (2001), 107-146.
[13] Michael Ross, "A Closer Look at Oil, Diamonds, and Civil War," *Annual Review of Political Science*, Vol. 9 (2006), p. 295
[14] Michael L. Ross, "What Do We Know about Natural Resources and Civil War?" *Journal of Peace Research*, Vol. 41, no. 3 (May 2004), p. 352.
[15] See Michael Ross, "A Closer Look at Oil, Diamonds, and Civil War," *Annual Review of Political Science*, Vol. 9 (2006); also, Paul Collier and Anke Hoeffler, "Greed and Grievance in Civil War," World Bank, DECRG (2002). Available at *http://econ.worldbank.org/programs/conflict*.

system, in which states can only attain security by accumulating power, which in turn threatens other states. Extending this basic framework, Stephen Van Evera's book, *Causes of War*, focuses on "causes related to the *character and distribution of national power*." He articulates five hypotheses:

- War is more likely when states fall prey to false optimism about a favorable outcome.
- War is more likely when a significant advantage lies with the first side to mobilize or attack.
- War is more likely when the relative power of states fluctuates sharply—that is, when windows of opportunity and vulnerability are large.
- War is more likely when resources are cumulative—that is, when the control of resources enables a state to protect or acquire other resources.
- War is more likely when conquest is easy.[16]

- "The absence of war between democracies comes as close as anything we have to an empirical law in international relations," according to Jack Levy.[17] The inverse of this so-called democratic peace theory implies that *lack of democracy* helps explain inter-state wars. Though this observation points clearly in favor of policies to promote democratization, Mansfield and Snyder have found that while peace between democracies holds for mature, stable democracies, *states transitioning to democracy* "become more war-prone, not less, and they do fight wars with democratic states.[18]

- Some scholars have argued that *misperceptions* are important causes of war, particularly when they concern "the adversary's capabilities or intentions."[19] Drawing on psychology and organizational theory, studies suggest that these kinds of misperceptions are quite common in governments, militaries, and the individuals who lead them, especially in high-stress crisis situations.

- Among the various kinds of disputes that can lead to war between states, *disputes over territory* appear to be especially combustible. Vasquez and Henehan, for example, found that territorial disputes "have a higher (conditional) probability of going to war than policy or regime disputes," and account for the majority of wars between 1816 and 1992.[20]

III. Most Significant Challenges to Peace over the Next Decade

During a series of workings sessions conducted with USIP staff, the above drivers of conflict were coupled with an assessment of the current geo-political landscape to identify the following contemporary threats to peace:

- Environmental degradation / climate change
  - Lack of water
  - Reduced food supplies / marine resources
  - Competition for energy / environmental resources
- Weapons of mass destruction
  - Increasing ability to acquire, develop, and transport

[16] Stephen Van Evera, *Causes of War* (Ithaca, NY: Cornell University Press, 1999), p. 4.
[17] Jack S. Levy, "Domestic Politics and War," in Robert I. Rotberg and Theodore K. Rabb, eds., *The Origin and Prevention of Major Wars* (Cambridge, UK: Cambridge University Press, 1988), p. 88.
[18] Edward Mansfield and Jack Snyder, "Democratization and War," *Foreign Affairs* (May/June 1995).
[19] Jack S. Levy, "Misperception and the Causes of War: Theoretical Linkages and Analytical Problems," *World Politics*, Vol. 36, no. 1 (October 1983), pp.76-99.
[20] John Vasquez & Marie T. Henehan, "Territorial Disputes and the Probability of War, 1816-1992," *Journal of Peace Research*, Vol. 38, no. 2 (March 2001), pp. 123-138.

  - Increasing incentives to develop; increasing willingness to use
  - Continuing erosion of WMD non-proliferation regimes, and incipient erosion of nuclear deterrence
- Weak economies / Fragile states / Undemocratic states
  - Subject to popular unrest or power grabs
  - Islamic radicalism, particularly when combined with undemocratic societies with weak or oil-dependant economies and with few opportunities for the population
  - Disproportionate number of unemployed people under the age of 30 in developing countries prone to conflict
- Weak international institutions / lack of will to act
  - Lack of international institutions with the (perceived) legitimacy to mediate disputes/hold offenders accountable
  - Inability to mobilize preventive action / lack of will to act
  - Declining U.S. power and resultant incentive to others to challenge existing power relationships
- Clash of civilizations/ideologies
- Growing number of disenfranchised
  - Widening gaps between rich and poor
  - Radicalization and empowerment (e.g., WMD, global reach) of disenfranchised and otherwise alienated groups
- Global population movements (e.g., refugees, legal and illegal immigration)
- Perverse effects of globalization
  - Localized problems cascading catastrophically (including but not limited to pandemics)
  - Increased awareness on the part of the disenfranchised, stimulated by pervasive mass media / internet