color figures

"False Truths": Ethics and Mapping as a Profession
Tom Koch

Figure 1. Long-lived smokers is a potential response to the hypothetical ATT contract for a map of data on smokers over 70 years of age in the United States. Map by author.

War with insurgents ramped up

American forces stepped up their campaign to suppress deadly roadside bombs which accounted for most of the 96 deaths among U.S. service members last month.

U.S. and Iraqi forces launched a major offensive against Husaybah, a major way station for foreign fighters entering the country from Syria

A roadside bomb killed a policeman and wounded three others Tuesday

▶ A lawyer for one of Saddam Hussein's co-defendants was assassinated and another wounded

▶ Suicide car bomb killed four Americans and a civilian

Four Iraqi soldiers, including a major, were killed by a roadside bomb

Five insurgents were killed by Marines Monday

A senior member of the Iraqi police and another policeman were killed by a bomb

Kirkuk
Husaybah
Khalis
Ramadi
Baghdad
I R A Q
IRAN
Basra
SAUDI ARABIA
KUWAIT

0 50 mi
0 50 km

SOURCE: ESRI   AP

Figure 2. This map-story by the Associated Press of military events in Iraq argued for increased US military activity in response to "foreign" insurgents. (AP Graphic). Accessed 8 Nov. 2005 at http://global.net/.
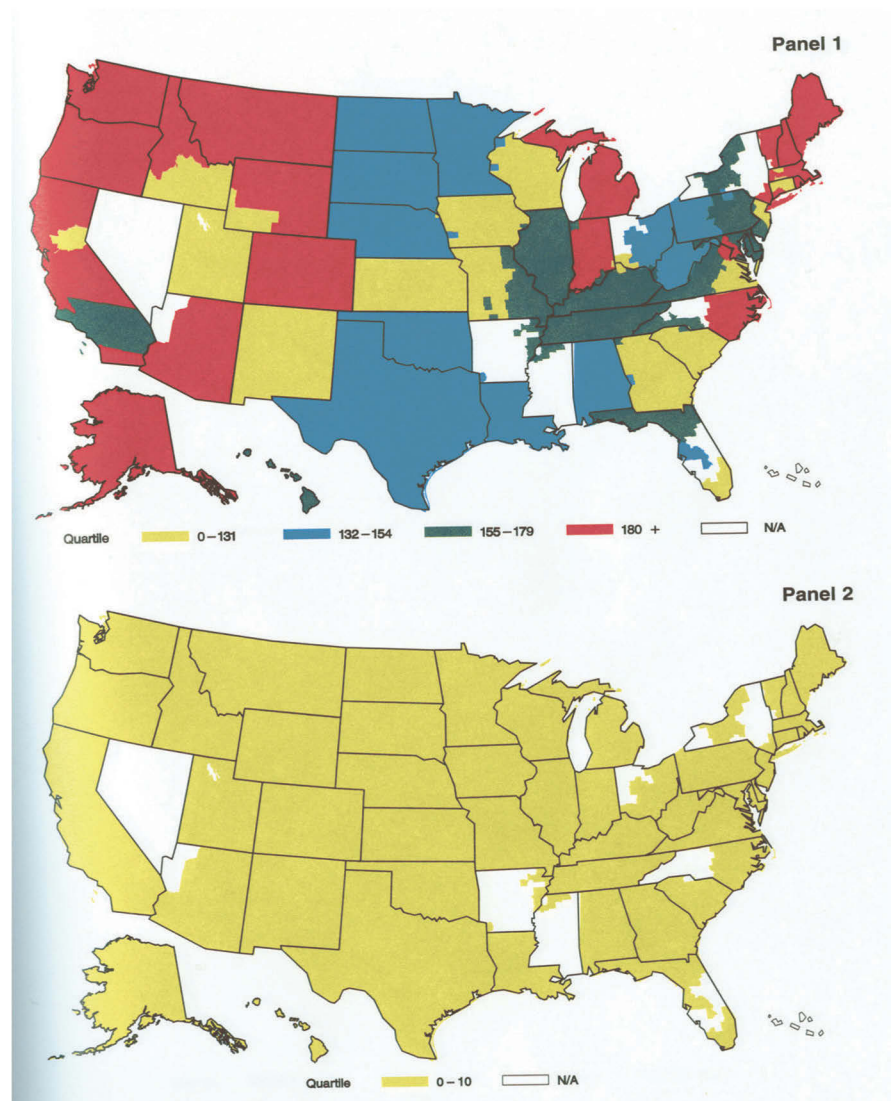
Figure 3. The map of liver transplant candidate waiting times for all those with liver disease (top) and those in urgent need of a liver transplant argued equality of service for critical patients but variable waiting times in some places for non-urgent patients. Source: National Institute of Medicine. Organ Procurement and Transplantation, 58a.

Non-Photorealistic Rendering and Terrain Representation
Patrick J. Kennelly and A. Jon Kimerling
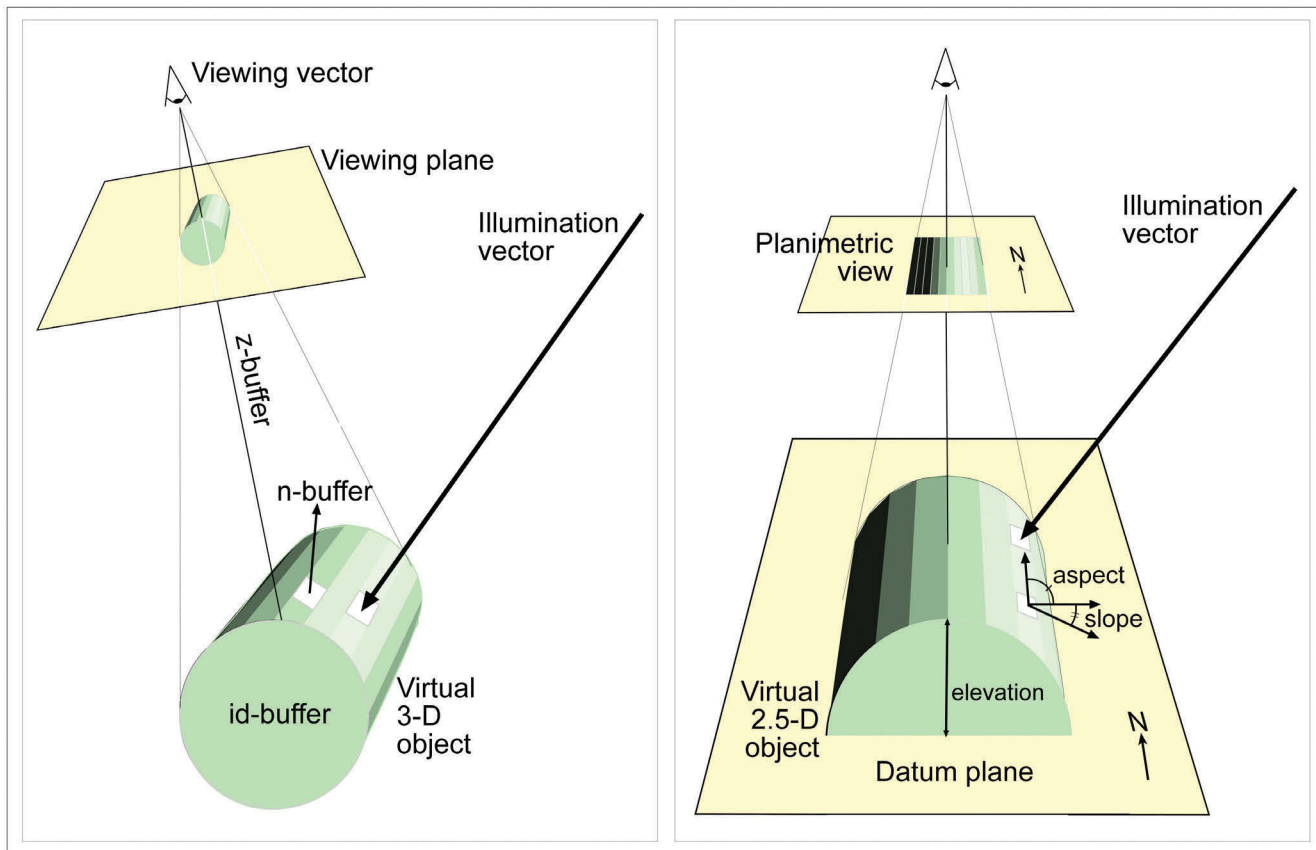
a) Selected elements of the framework used in rendering computer graphics.

b) Selected elements of the framework used in terrain representation.

Figure 1. Selected elements of the frameworks used for rendering computer graphics and terrain. a) The geometric buffers used for rendering, including the z-buffer, n-buffer, and id-buffer. Also shown are the relationships among the viewing vector and plane, the 3-D virtual object, and the illumination vector. b) The metrics used for representing terrain, including elevation, slope and aspect. Also shown are the relationships among the planimetrically correct map, the datum plane, and the illumination vector.
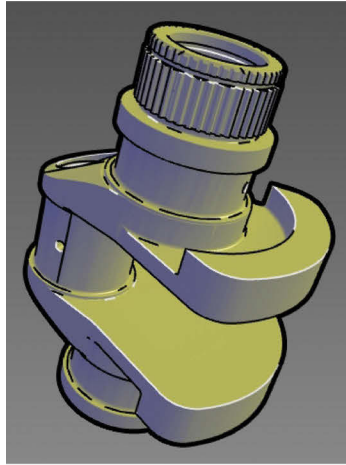
a) Silhouette and crease
lines (Gooch et al., 1999)

b) Illuminated contours
(after Imhof, 1982)
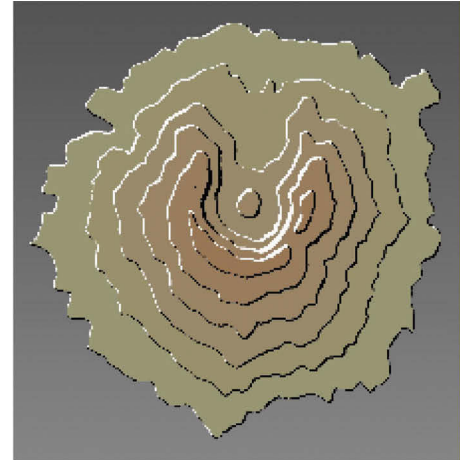
c) Illuminated contours (after
Kennelly and Kimerling, 2001)

Figure 7. A comparison of illuminated contours with crease and silhouette lines. The right shows silhouette lines in black and crease lines in white designed to communicate the shape and structure of a complex mechanical model (Reprinted from A.A. Gooch and B. Gooch, 1999 with permission from ACM SIGGRAPH). The middle is a hand-rendered illuminated contour map (Modified from the cover of Imhof (1982)). The left is a computer automated illuminated contour map of Mt. St. Helens in Washington state (modified from Kennelly and Kimerling (2001) with permission from Cartography and Geographic Information Science).
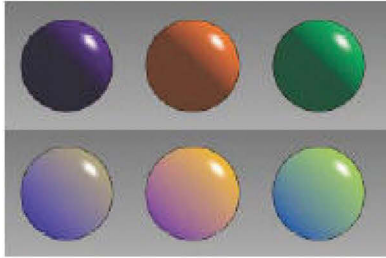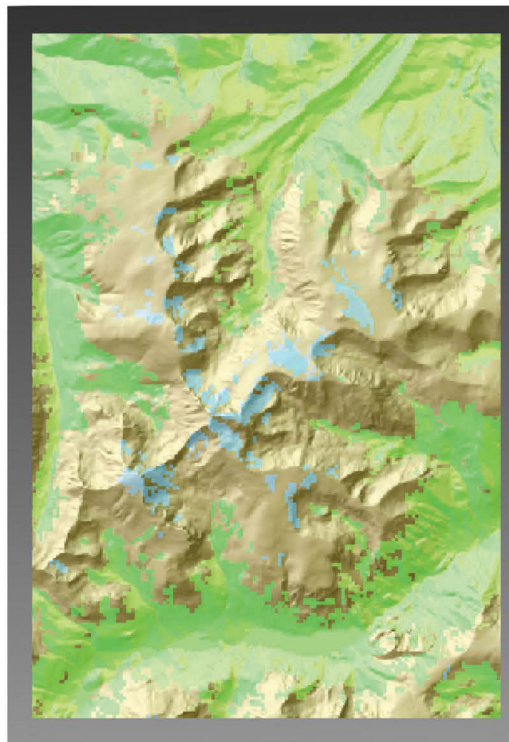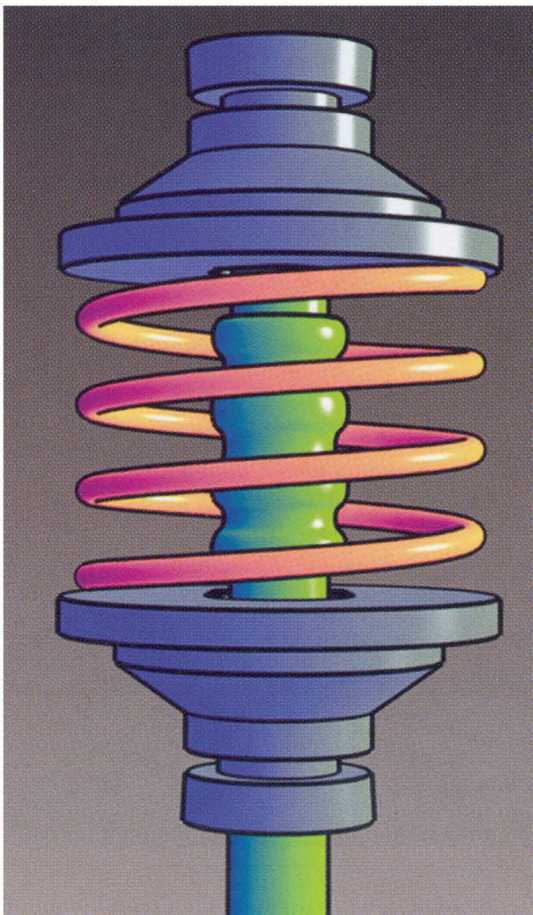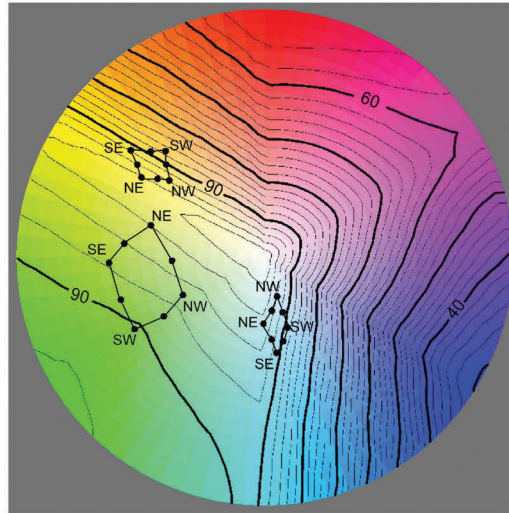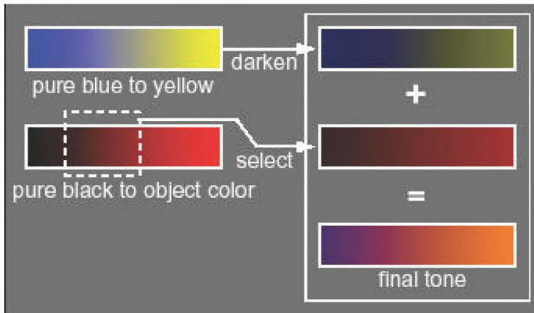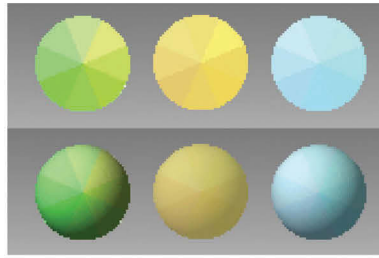
Figure 9. *These two coloring schemes add color details and highlights to conventional shading techniques. The NPR technique on the left uses cool to warm undertones to add subtle tonal variations to object colors (From Gooch et al., 1998 with permission from ACM SIGGRAPH). The terrain rendering scheme on the right of a portion of the Absaroka mountains of southwestern Montana uses aspect-variant colors that add luminous highlights and enhance shading of surface elements (Modified from Kennelly and Kimerling (2004) with permission of Cartography and Geographic Information Science).*

From Afghanistan to Iraq in Media Maps: Journalistic Construction of Geographic Knowledge
Robert R. Churchill and E. Hope Stege

*Figure 1. "Battleground Briefing." Time, 22 October, 2001. © 2006 Time Inc. All rights reserved. Reprinted from **Time Magazine** ® with permission. Cartography by Missy Adams and Joe Lertola.*

Kill zones

The tunnels and caves of Tora Bora are al Qaeda's last major stronghold in Afghanistan. To assist Afghan opposition forces on the ground, U.S. forces are unleashing an arsenal of devastating weapons to drive al Qaeda troops into the open.

B-52

B-52
The workhorse of the U.S. Air Force, the B-52 is used to drop 500-pound "dumb bombs" and JDAM satellite-guided bombs.

MC-130

1 BLU-82 "DAISY CUTTER"
The most powerful conventional weapon in the U.S. arsenal, the 15,000-pound BLU-82 is generally dropped in low areas surrounded by mountains. Its explosive force reverberates around the surrounding valley, entering the mouths of the caves and destroying everything inside.

Stabilizing parachute

BLU-82

Bomb cradle
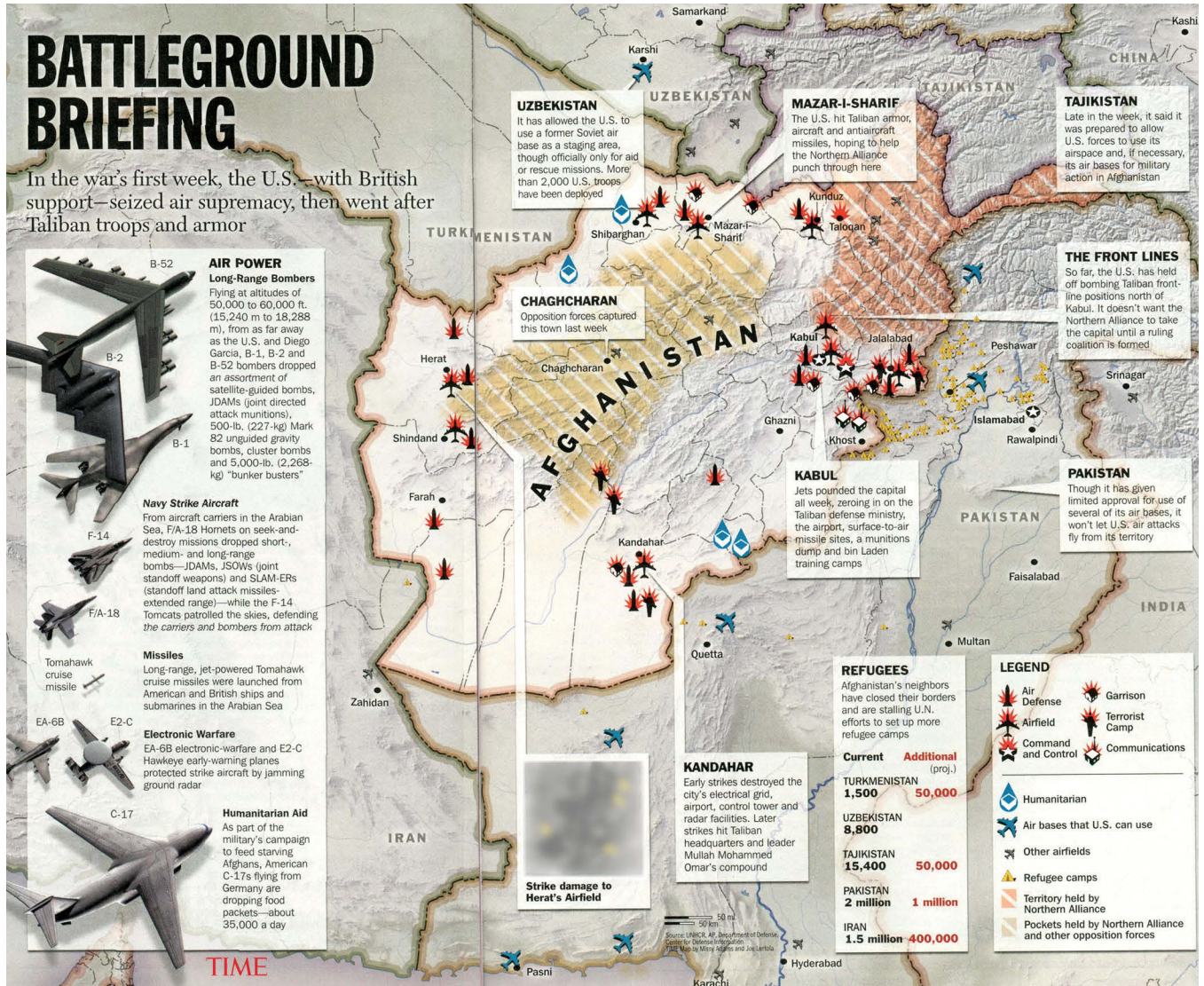
AC-130 GUNSHIPS
The AC-130 Spectre provides close air support for special operations forces. The planes can unleash devastating attacks on ground targets with a 105-mm howitzer and 40-mm cannon.

AC-130

2 DROPPING THE BLU-82
The bomb is so heavy that it must be pushed out the back of an MC-130 cargo plane. Upon release, a stabilizing parachute opens to help guide it to its target. Because of the enormous blast, the bomb must be dropped from at least 6,000 feet above ground.

North

SPIN GHAR RIDGE

SPIN GHAR RANGE

PAKISTAN

Tora Bora

GROUND TROOPS
There are more than 100 U.S. special operations forces on the ground in the Tora Bora area. The troops are working with Afghan opposition forces and stand poised to snatch al Qaeda fighters should they try to escape the tunnel complex to Pakistan.

3 THE BLAST
The BLU-82 packs 12,600 pounds of explosives, which incinerate everything within 600 yards of its blast. The bomb explodes 3 feet above ground to cut a wide swath of destruction without digging a crater.

A F G H A N I S T A N

Map source: East View Cartographic: www.cartographic.com

GRAPHIC BY ROB CADY, ROD LITTLE, AND DOUG STERN—*USN&WR*

Jalalabad

Kabul

Area of deta

AFGHANISTAN

Figure 2. "Kill Zones." U.S. News & World Report, *24 December, 2001.* Copyright 2001 U.S. News & World Report, L.P. Reprinted with permission. *Cartography by Rob Cady, Rod Little, and Doug Stern.*
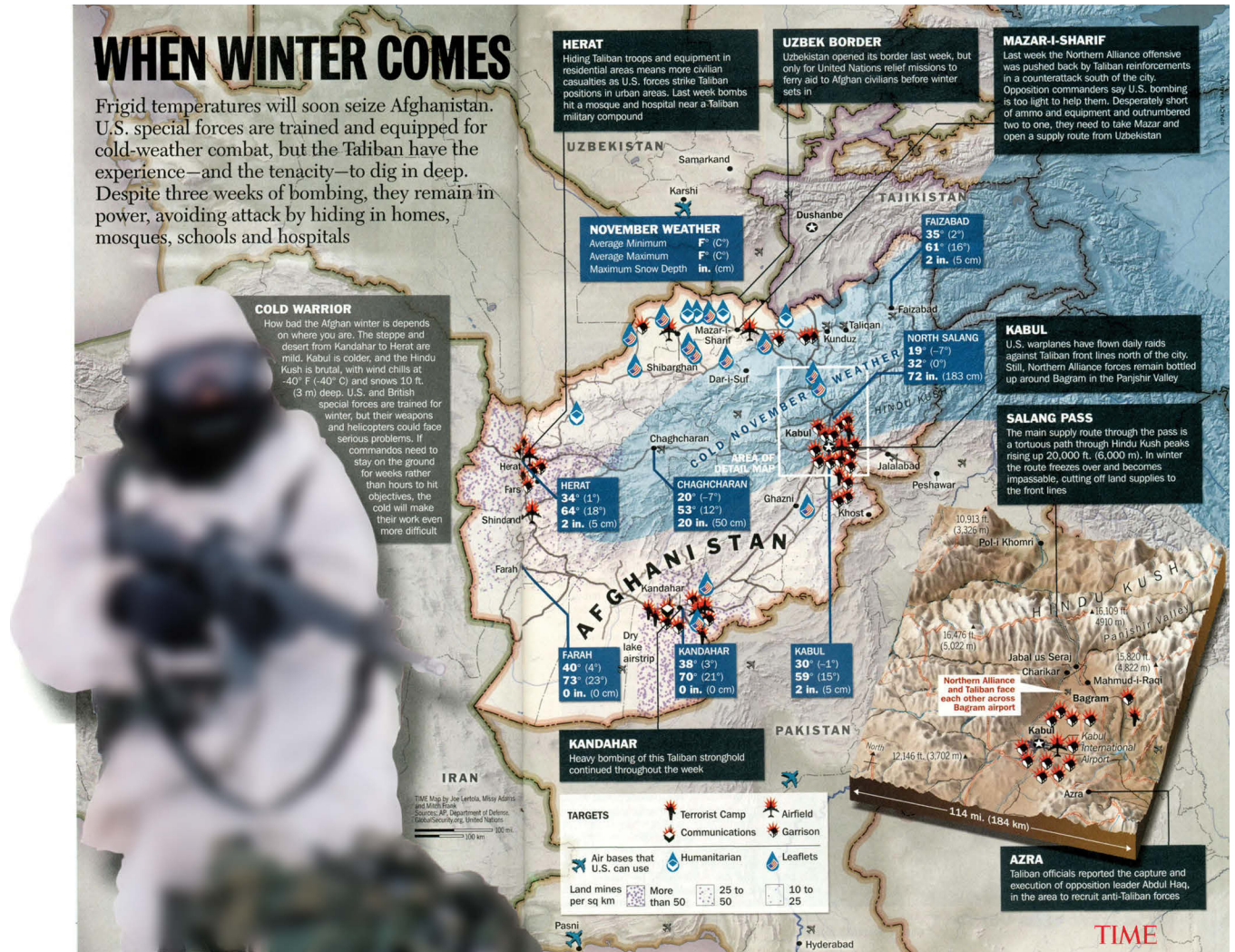
Figure 3. "When Winter Comes." Time, 5 November, 2001. Satellite images courtesy of Space Imaging. © 2006 Time Inc. All rights reserved. Reprinted from **Time Magazine** ® with permission. *Cartography by Joe Lertola, Missy Adams, and Mitch Frank.*

Figure 5. "Saddam's Game." Time, 2 September, 2002. © 2006 Time Inc. All rights reserved. Reprinted from **Time Magazine** *® with permission. Cartography by Jackson Dykman.*

The Road to Baghdad

In planning an attack, the Bush administration must address a host of military and diplomatic factors. One key question: can the military strike Baghdad fast enough to paralyze Saddam's communications and isolate the man himself? A primer:

TROOP STRENGTH

The Iraqi Army is about one third its gulf-war size—down from 1.2 million in 1990—and many of the troops are poorly trained.

	IRAQ	U.S.
Army	424,000	485,536
Reserves	650,000	865,200
Marine Corps	–	173,385
Navy	2,000	384,576
Air Force	30,000	369,721
Air Defense Command	17,000	–
Paramilitary	44,000	–
Coast Guard	–	37,166

IRAQI WEAPONS

Much of Iraq's military equipment was destroyed during the gulf war and much of its aging hardware is short of spare parts.

Main battle tanks	2,200
Other armored vehicles	3,700
Major artillery weapons	2,400
Combat aircraft	300

LEGEND

- Nuclear installation
- Biological installation
- Chemical installation
- Ballistic-missile production
- Number of Saddam's palaces
- Iraqi Army base
- Iraqi air base
- Iraqi naval base

1 ASSASSINATION OR INTERNAL COUP: This is probably the least likely scenario, given that Saddam has three rings of bodyguards and at least two of those are fanatical in their devotion to him. In addition, loyalty within the Army (and the rest of the population) is ensured by a network of security organizations, which spy on everyone, including each other. The most powerful is the Special Security Organization, which is under the direct control of Saddam's son Qusay and Saddam's personal secretary, Gen. Abdul Ihmid Hmud.

2 COUP DE MAIN—PANAMA STYLE: This plan, also known as Inside Out, harks back to December 1989, when the United States rolled up Manuel Noriega's brutal regime in Panama in virtually one fell swoop. While it would be nearly impossible to replicate this operation against Iraq (it's too big, too far away and the chance of surprise would be zero), the United States might be able to paralyze Saddam's regime by taking out his headquarters, clustered in a confined area of central Baghdad.

The skies over Turkey and northern Iraq are one option if the Saudis continue to deny the United States their airspace.

During the gulf war, the United States had free rein to use Saudi soil, but it's unlikely it'll be in for another round. Can America persuade Qatar to be the new springboard?

U.S. aircraft carriers deployed inside the Persian Gulf could launch airstrikes, but only if Iran stays neutral.

OPPOSITION PARTIES

Though splintered and lightly armed, Iraqi dissidents are sure to be featured in any U.S. plan to oust Saddam, if only for public-relations reasons.

Patriotic Union of Kurdistan	15,000
Kurdish Democratic Party	15,000
Supreme Council of the Islamic Resistance	6,000
Iraqi National Congress	1,000
Iraqi National Accord	Several hundred

3 AFGHANISTAN REDUX: The idea of using Special Forces and high-precision airstrikes to add decisive muscle to a militia of local dissidents was initially favored by some, but has since been abandoned. Reason: the Kurds don't want to fight, the Iraqi opposition has no forces worthy of the name and the Iraqi military is a leviathan compared with the Taliban.

4 DESERT STORM TWO: At the other extreme, Central Command had kept a plan for a rerun of Desert Storm, with 250,000 troops invading Iraq from multiple points. It would work. The problem? The three-month buildup would give Saddam time to hand off his stocks of chemical and biological agents to Al Qaeda and other terrorist groups.

5 DESERT STORM LITE: Part *coup de main*, part conventional attack, part ingenious use of Special Forces, this concept incorporates all the elements. Ground-force totals: 75,000-plus. It's the top choice right now, but the plan is still a gamble. If any one element goes badly awry, U.S. forces could find themselves locked in a bloody battle through the streets of Baghdad.
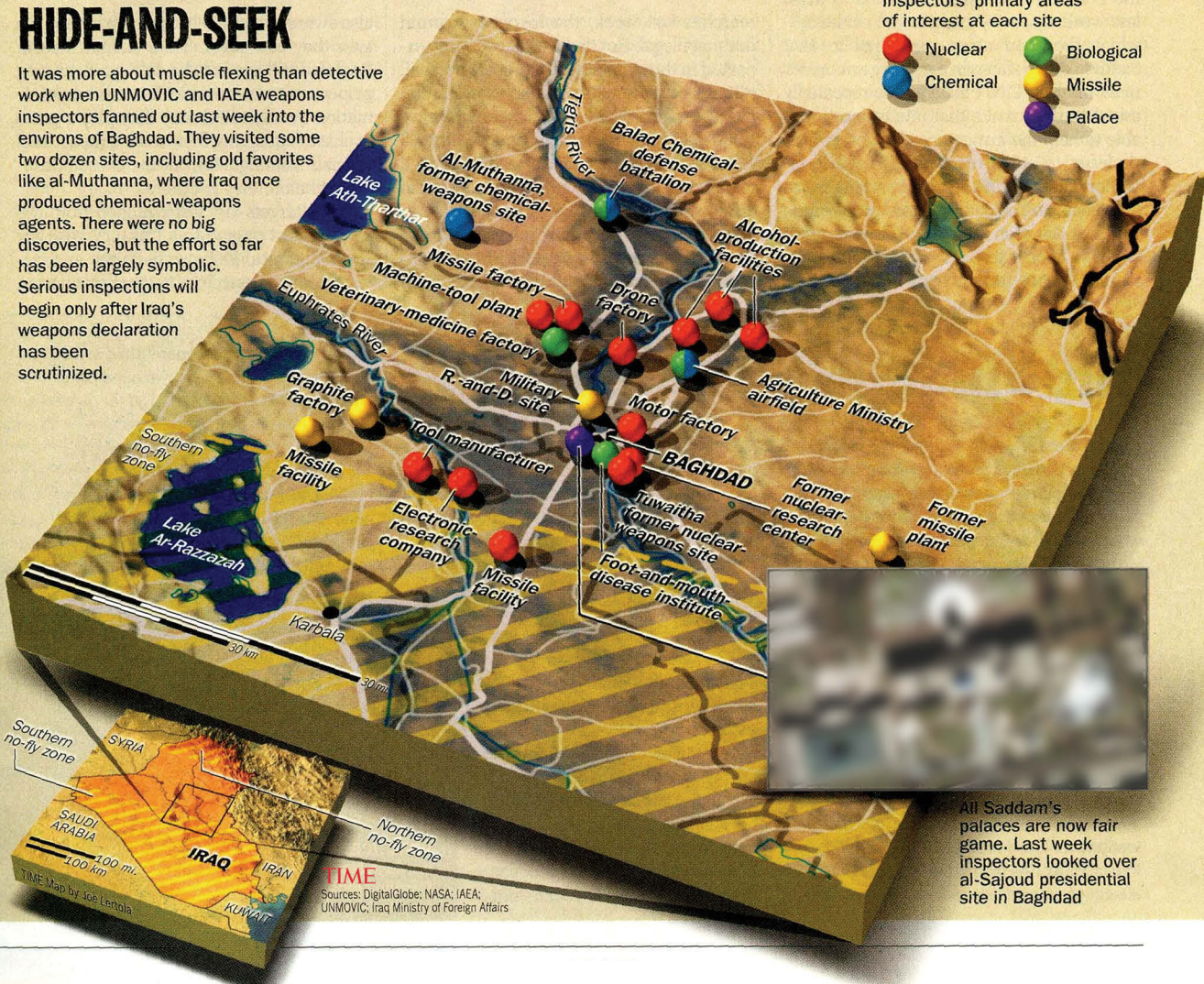
SOURCES: NEWSWEEK REPORTING; JANE'S; PERISCOPE USNI MILITARY DATABASE; "THE MILITARY BALANCE"; INTERNATIONAL INSTITUTE FOR STRATEGIC STUDIES; ANTHONY CORDESMAN, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES; AMAT ZIA BARAM, U.S. INSTITUTE OF PEACE; JOURNAL OF CONFLICT, SECURITY, AND DEVELOPMENT

IRAQ TOPOGRAPHIC MAP BY EAST VIEW CARTOGRAPHIC—WWW.CARTOGRAPHIC.COM

RESEARCH AND TEXT BY KAREN YOURISH. GRAPHIC BY BONNIE SCRANTON.

Countries in red have U.S. military bases

SEPTEMBER 16, 2002 NEWSWEEK

Figure 6. "The Road to Baghdad." Newsweek, 16 September, 2002. Newsweek—Bonnie Scranton. © 2002 Newsweek, Inc. All rights reserved. Reprinted by permission. Cartography by Bonnie Scranton.

Figure 7. "Hide-And-Seek." Time, *16 December, 2002.* © 2006 Time Inc. All rights reserved. Reprinted from Time Magazine ® with permission. *Cartography by Joe Lertola.*

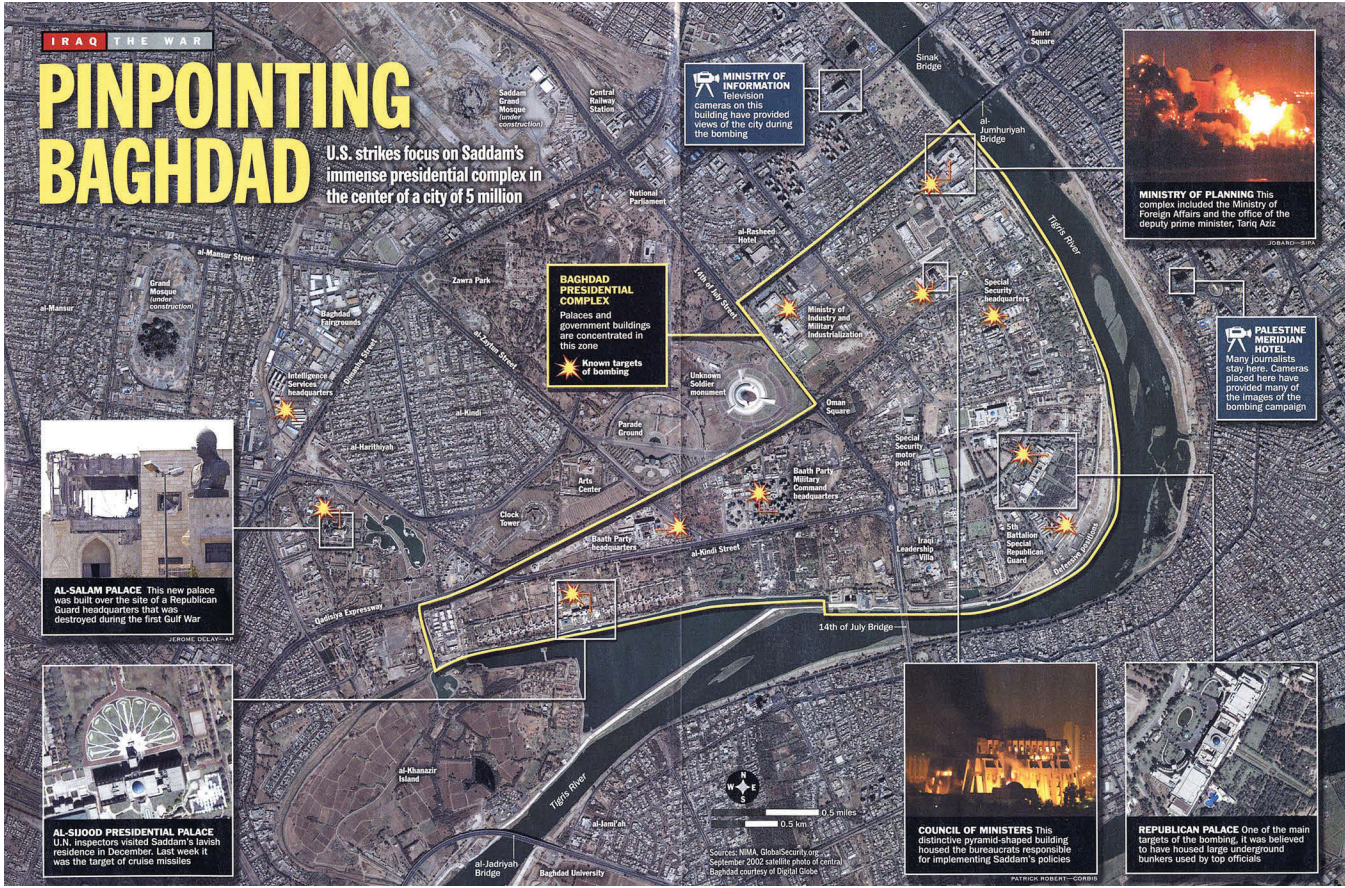*Figure 8. "Strike Force."* Time, *17 March, 2003.* © 2006 Time Inc. All rights reserved. Reprinted from **Time Magazine** ® *with permission. Cartography by Jackson Dykman.*