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FEATURES

Six Degrees of Mohamed Atta

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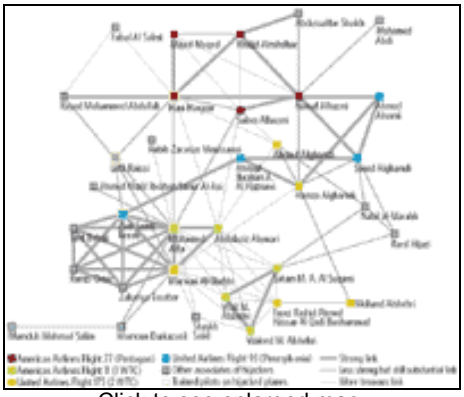
Good maps are underappreciated in times of war, as the world was reminded by the inadvertent U.S. bombing of the Chinese embassy in Belgrade in 1999, the result of attack planners' reliance on an out-of-date street map. Maps play a particularly vital role in netwar: If you can accurately map a network, you can figure out how to break it apart.

The illustration here is based on social network theorist Valdis Krebs's examination of the interrelationships between the 19 hijackers aboard the planes used in the Sept. 11 attack and 15 people authorities say are connected with them. Employing proprietary software called InFlow, normally used to help companies improve communication, Krebs entered every publicly disclosed contact between people in the network. He then dated and weighted the contacts. Strong ties -- such as sharing a house or attending the same flight school -- got more weight than weak ones such as telephone calls. (Not everyone listed is necessarily a terrorist, of course; some of the contacts may have been innocent.)



Click to see enlarged map.

When all the data was entered, the software drew a picture. It shows every direct contact between network members: Mohamed Atta, for example, is known to have been in touch with 16 others, with strong links (the thicker lines) to 6. Mohamed Abdi, by contrast, has just one known link, of medium strength.

InFlow also analyzes and clusters the nodes in the network -- that is, the people -- according to three measures. One is "degrees," or activity, which measures the number of times someone contacts others in the network. A second is "betweenness." For example, there appears to have been no direct link between Abdulaziz Alomari and Ziad Jarrah; Atta and Marwan Al-Shehhi stood between them. The more often someone is in that "between" position, the more control he exercises in the network. The third attribute is "closeness," which measures the extent to which a person has direct contact with others, with no go-between; this is another clue to how important an individual is to the network.

The map is the software's attempt to make a picture that takes all three attributes into account. It is not a

complete picture; among other problems, it shows only those links that have been publicly disclosed. Still, it's possible to make some interesting inferences. First, the greatest number of lines lead to Atta, who scores highest on all three measures, with Al-Shehhi, who is second in both activity and closeness, close behind. However, Nawaf Alhazmi, one of the American Flight 77 hijackers, is an interesting figure. In Krebs's number crunching, Alhazmi comes in second in betweenness, suggesting that he exercised a lot of control, but fourth in activity and only seventh in closeness. But if you eliminate the thinnest links (which also tend to be the most recent -- phone calls and other connections made just before Sept. 11), Alhazmi becomes the most powerful node in the net. He is first in both control and access, and second only to Atta in activity. It would be worth exploring the hypothesis that Alhazmi played a large role in planning the attacks, and Atta came to the fore when it was time to carry them out.

It's also clear that this network would have been hard to dismantle. A hub-and-spoke network, where there is no contact between nodes except through a central figure, is an easy target: If just the central node is destroyed, the network disintegrates. Network analysts say a highly centralized network typically can be taken down by eliminating about 5 percent of the nodes. But the diffuseness of the hijacker network means that it won't suffer significant damage until the six nodes with the most numerous and important connections -- 21 percent of the group -- are removed. ✦

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