Plumbers

BY DENNIS E. SHASHA

The director of a government organization shares confidences with nine advisers. To his dismay, however, some of his most intimate thoughts have lately been appearing in newspapers the day after he reveals them. A common technique for discovering leakers is to tell each suspect some unique piece of information (a tidbit) and then see if it spreads. But the director discovers that this approach will not be good enough: news editors will print a story only if at least three advisers attest to the tidbit. He is quite sure there are no more than three leakers.

He has a dilemma. If he tells a tidbit to everyone, it will certainly be reported, but he will not have learned anything. If he tells a tidbit to one or two people, it won't be reported. He can choose a different tidbit for each triplet of people, but nine confidants can form 84 triplets—too many. He arrives at the following strategy: he will tell a tidbit to foursomes, one tidbit a day. Once a leak occurs, he will narrow down the number of triplets that remain suspect. One of his goals is to provoke no more than two leaks—one from a foursome and, at most, one from a threesome. Another goal is to find

a sequence of foursomes such that he can guarantee getting one of them to produce a leak and can zero in on a leaking triplet using at most 25 tidbits. Can you help him?

To warm up, suppose the director tells a tidbit to advisers 1, 2, 3 and 4 the first day without a leak and a second tidbit to advisers 2, 3, 4 and 5 the next day with the same outcome. But his third tidbit, told to advisers 1, 2, 4 and 5, reaches the papers. Which triplets are suspect? Only two of the four that could be formed from the third quartet: 1-2-5 and 1-4-5. If either of the other two triplets comprised the leakers, one of the first two tidbits would have been leaked. Because the director knows he has only three leakers, he needs to test just one of the remaining two suspect triplets.

The director might be able to find the precise triplet using far fewer tidbits if he sometimes spreads tidbits to more than four people and is willing to tolerate more than two leaks. What do you think?

Dennis E. Shasha's latest puzzle book is Dr. Ecco's Cyberpuzzles, *published by W. W. Norton (2002).*

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