

HROC's chief scientist led a project that transitioned DARPA's biggest project – the Internet – into the World Wide Web...and that work's principles are relevant today in Ukraine

Problem:

- During the Cold War, a concern was a Soviet missile strike would destroy the U.S.' stored information
- DARPA's ARPANET (eventually becoming the Internet and WWW) project, and its top principle, apply again today: **We must avoid single points of failure!**
- **Concentrated resources** are inviting targets for attacks, like nuclear power plants, hospitals, etc.
- For example, 400 medical facilities are destroyed in Ukraine as of May 5th, and some areas now have no hospitals at all (at least 150 of them hospitals)
- And during the invasion, Russians destroyed a solar energy plant in Merefya, and stole the Tokmak solar plant in the Zaporizhia region, largest in Ukraine

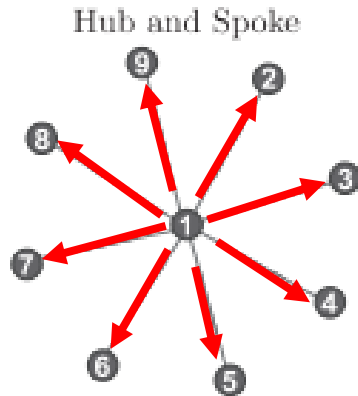
Goal: Now **centralized hospitals need to be distributed**, and centralized **energy sources** need to be distributed

How: Our DARPA projects enabled us to take concentrated resources to become distributed resources, via:

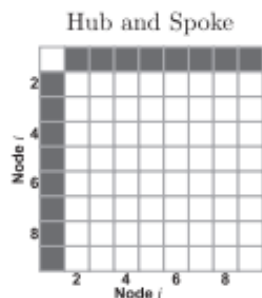
- **Load balancing** (e.g., of data and of bandwidth)
- **Prediction** (e.g., in caching, and many other areas)
- **Fungibility** (e.g., shifting data, and other resources)
- Arbitrage (e.g., getting disproportionate returns by using hidden information, like "Tipping Points")
- "Self-sustaining" independent distributed nodes, but coordinated toward greater, synergistic effect

These same principles can help Ukraine's plight today

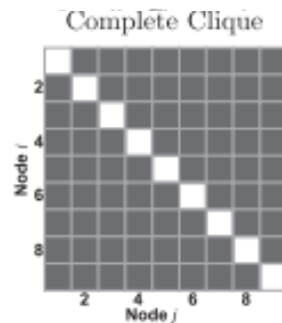
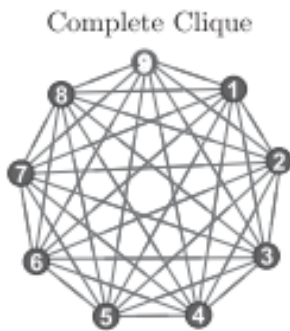
Our work on the early World Wide Web



From **high-risk** (i.e., of attack from Soviets or from any computer's single failure) **centralized resources...**



...to high-resilience distributed networked resources (via micro-targeting, multicasting protocols)



Load balancing then gave network "high reliability" and with high resourcefulness

CHANGING THE WAY PEOPLE THINK

