Repairing the infrastructure—it’s not just about bridges and highways. With a new administration taking over in Washington this year, we need to focus our attention on the state of the information technology infrastructure here in the US. The IT infrastructure that has emerged over the past few decades largely drove economic growth during much of the 1990s and enabled our paradigm shift from a manufacturing economy to a service-based one, but its key areas have begun to show signs of aging. We can’t rebuild a healthy economy in the US and remain competitive abroad unless we improve and expand our infrastructure. In my opinion, we must focus on some specific critical areas:

- **Extending the broadband network.** Evidence increasingly indicates that access to the Internet is a significant determinant of success in the US educational system, and broadband networks can provide advanced healthcare services to rural, remote, and underserved areas. The lack of an adequate nationwide broadband infrastructure is one of the main reasons why the US currently ranks 15th among the 30 Organization for Economic Cooperation and Development (OECD) nations in broadband adoption.
- **Implementing healthcare IT and a national health information network.** Implementation of electronic health records and a national health information network can significantly improve the quality of healthcare in the US and restrain rising costs. However, only 25 percent of hospitals in the US and an even smaller number of private-practice physicians have implemented a fully functional electronic medical record system.
- **Building a new air traffic control system.** Our current system uses antiquated technology, suffers from frequent malfunctions, and guides planes via fixed paths from one traffic control center to the next, which often involves many more miles than a direct point-to-point route. Use of a GPS-based next-generation system, which the aviation industry has proposed for more than a decade, could greatly reduce flight times and increase fuel economy. The US Federal Aviation Administration (FAA) projects that if we don’t implement this system by 2015, our outdated system won’t be able to handle the projected traffic demand. Many countries, including France, China, Australia, and Indonesia, are already in the process of implementing next-generation GPS systems.
- **Morphing the electrical grid into an “energy Internet.”** We need a “smart” electrical grid that can integrate alternative electricity sources and manage loads effectively. Much attention has focused lately on developing alternative sources of energy, such as wind and solar. However, the parts of the country with the greatest potential for generating alternative energy are located far from the metropolitan areas that consume the most energy. To use wind and solar power efficiently, we must build a new electrical transmission system to transport renewable energy to the areas that need it most. And because the wind doesn’t always blow and the sun doesn’t shine at night, we need sophisticated network management systems to integrate these new energy sources into our conventional power grid.
- **Fixing the US Food and Drug Administration’s IT system.** The FDA is chartered to guarantee the safety of the more than US$1 trillion worth of food, drugs, and cosmetics that Americans consume annually, much of it...
arriving from overseas. Yet much of the FDA’s IT is out of date and unable to accurately track and monitor the 18 million shipments of food, pharmaceuticals, and cosmetics that enter the US each year. Improvements in database technology and extended use of RFID sensors could help ensure the safety of the products we consume.

Fixing the infrastructure isn’t just about computers and software. Building and maintaining an IT infrastructure requires a skilled workforce that has the intellectual wherewithal to innovate. This will require serious investments in technical education and research, areas that have been significantly underfunded in the past. Fixing the IT infrastructure will also require an unprecedented degree of public/private partnership. The reason should be obvious—the government doesn’t make computers or software, and private corporations don’t make national policy. The challenge is clear, so let’s hope the politicians are listening.

Thomas Jepsen is an IT consultant in Chapel Hill, North Carolina. He has published books on Java, storage networks, and healthcare IT. Jepsen has a BA from the University of Colorado and did graduate work in computer science at North Carolina State University. Contact him at tjepsen@mindspring.com.

Ontologies, OWL, and the Semantic Web

Ever since Tim Berners-Lee first coined the term in a 2001 Scientific American article, the Semantic Web has attracted the interest of IT professionals who see great promise in the possibility of having the Web seem to “understand” human queries. The use of ontologies and the Web Ontology Language (OWL) have contributed to the Semantic Web’s potential by making it possible to represent relationships in a way that enables reasoning and logical associations.

For an upcoming theme issue of IT Professional, we’re soliciting submissions that discuss current and future developments in these areas. Topics might include, but are not limited to, the following:

- Resource Description Framework (RDF)
- Web Ontology Language (OWL)
- Semantic Web applications
- Biomedical applications of the Semantic Web, including NextBio
- Ontology tools, such as Protégé
- The Linking Open Data Project
- Semantically interlinked online communities (SIOC)
- The Semantic Web and Object Oriented Programming/Unified Modeling Language

If you’re interested in submitting an article, please visit www.computer.org/itpro for submission guidelines. Initial submissions are due 15 February, but if you find you need more time, contact the guest editor, Thomas Jepsen (tjepsen@mindspring.com), with a short abstract/article proposal.