Greg Bentley's Talk at the "Productivity in the 21st Century" Conference
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Right to start with, I have two confessions. First, I'm a CEO. And secondly, Bentley Systems is a software company. Thankfully, this conference deals with the whole 21st century, which will be more than enough time to redeem ourselves!

One gratifying aspect of the work we do at Bentley is that our software directly relates to and in fact enables **real**-world infrastructure. We are the largest company in the world dedicated to software for the architecture, engineering and construction (that is "AEC") of physical infrastructure: roads and rail, public works, industrial plants, utility networks, and commercial buildings. What you're seeing here are some representative projects designed with Bentley software, through digital models that produce these renderings and the corresponding engineering drawings. The virtual models result in faster and more efficient construction of better-suited and more productive assets.

Our annual revenues are over $200 million; we are profitable and have never had material layoffs; and the company is majority-owned by our 1300 employees. After 18 years we filed for an IPO on the New York Stock Exchange in April of this year, believe it or not.

My four brothers who founded Bentley Systems are respectively chemical, electrical, mechanical, and systems engineers. Since MY background is finance and decision sciences, naturally I don't get any respect at home. And I'm obviously way out of my league today, as far as economics, so I will limit my observations to lessons from our company's experience.

So, before delving into the whole century, I believe it is necessary to address this question of the day: if IT has been correctly credited for much of the productivity improvement over the last generation, does our industry's current poor financial performance mean that the economy is bound to suffer a corresponding downturn in productivity growth?

To the contrary, I am convinced that IT's productivity contributions are constant and sustainable. Deployed hardware and software indeed ever continues to add increasing value, and at a rate which is probably accelerating. But unfortunately for most technology vendors, there is a disconnect in their business models.

Software companies, especially, rely primarily on one-time sales of upfront perpetual licenses. In the case of design software such as ours, revenues typically depend literally on the demand for "new seats" within user organizations. But these organizations rarely wish to add "new seats," especially with software helping them to continually increase the productivity of the seats they already have! For those seats, the software vendors were previously paid upfront, so they have no economic stake in this ongoing productivity growth.

The evident and inevitable solution, though at the cost of upfront revenues, is for vendors to adopt subscription formats which permit and incent us to participate economically in the productivity growth which we are confident in being able to support. A further advantage is that IT improvements will then naturally be delivered in manageable incremental streams, rather than disruptive "upgrades." The users, the vendors and their investors all ultimately benefit.

As a private company free from quarterly license sales pressures, Bentley has taken advantage of our discretion to largely convert already to the subscription business model. Mainly for this reason, our revenues have continued to grow, even this year, with our users' productivity. And there is no point of diminishing returns in prospect.

Our AEC users have been relatively conservative in expenditures and adoption of information technology. Some inhibitors are inherent: each project is ultimately local, and most are one-of-a-kind. But dot-com investors saw in this the potential for revolutionary advances through online collaboration and procurement, and nearly a billion dollars were funneled into efforts towards Internet solutions for construction.

Does the demise of all these dot-com startups imply that their promised radical productivity gains are impossible?

My answer is emphatically, "No!" Even the short-lived fascination with "B2B e-commerce" served a useful purpose by highlighting costly inefficiencies and points of friction that could be minimized through intelligent information transactions.

Here is a striking indication of the potential for productivity improvements over the lifecycles of design, construction and operation of infrastructure assets—the world economy's largest sector. Even today, the principal outputs generated from the digital models of the sort you saw as I began-- which represent and which capture the creative and expensive work of our architecture and engineering professions-- are merely the traditional paper drawings provided for contracting and construction, and which are explicitly intended to PREVENT intelligent searches and queries. Typically the asset owners and operators don't care to receive even these least-common-denominator drawings, since it ends up that they don't accurately represent what got actually built. The models themselves are marooned BEFORE construction!

But in actuality these models comprise indispensable "content" to support in turn schedule simulations, code checking, design reviews, interference detection, energy analysis, interactive estimating, indicative bidding, digital signatures, client visualization, maintenance and repair instructions, safety compliance, procurement, facilities management, asset tracking, move management, change tracking, renovation and retrofit—just to mention some existing applications from Bentley. The digital model gains in information content and value over the asset operations lifecycle, maximizing the return on the asset's capital investment through increasing returns on the cumulative information asset. Secured through digital rights authorizations, the content can also be preserved and reused for future projects by the architects and engineers who created the models at the outset, in addition to the benefits for the ultimate owner.

For instance, consider the usefulness of the virtual models of our critical infrastructure assets -- all of which are documented in some by-now digital form, depending on their vintage -- for homeland security applications, including vulnerability assessment and consequence management. What could contribute more to protect our whole economy's productivity? And this is just one example of unanticipated future dividends from cumulative IT investments. I believe there is a case for confidence that we will continue to find new sources of economic contribution that don't even depend on breakthroughs in technology, but rather our ingenuity and resourcefulness in applying it.

So with all this existing productivity headroom, what happened to the bubble's revolutionary expectations for "disruptive technologies"? We should not be surprised that the bottlenecks encountered have had to do with institutionalized business processes. For one thing, the various disciplines and contractual phases throughout AEC projects each work within different discrete "vocabularies". This was never a problem when the medium of exchange was paper, and interpretation never needed to be mechanical, but it stops dead the straight-through-processing premise of e-commerce.

The new standards required will at best emerge slowly (compared to the rate of technology change). A more perverse institutional obstacle is that the design professions are to date compensated based on hours expended, with scant short-term incentive for their own productivity, let alone the lifecycle productivity of the content or the assets they create.

So, while the envisioned breakthroughs can be eventually feasible, their realization depends upon changes in business practices that, while duly underway, are at best evolutionary. Recognizing that these changes in AEC or any other domain will take decades rather than overnight does not justify any attitude of "capitulation," however, since the productivity benefits will be literally many-fold, and are certain to be ultimately accomplished and bettered.

In fact, it is interesting for me to reflect on the pace of IT evolution even for an "enterprise" like Bentley Systems. It happens to be just about technically feasible for a software company to be comprehensively "virtual", with marketing, distribution, and technical support all performed interactively online, for huge efficiency gains. However, even as motivated and ostensibly savvy as we may be, I have to acknowledge that it realistically requires multiple steps over multiple years for us to conscientiously adapt our internal systems and workflows. But rather than be discouraged that we're not already there, I find it reassuring to be able to confidently anticipate future progress against a known roadmap for enterprise productivity.

And I think the US software industry--which after all grew "from scratch" a few decades ago to dominate these key markets worldwide--provides some other applicable lessons for broader public policy, to maintain the most fertile environment for sustained productivity improvement.

The first lesson is that open, two-way trade pays off. Software's relatively favorable trade regime has been crucial in enabling it to flourish, to everyone's advantage. At the President's Economic Forum in Waco, I represented the software industry on the "Trade and Agriculture" panel (with Jim). With all due respect to agriculture (I live on a farm), I daresay that attendees were surprised to hear that software is an even larger trade surplus engine for the US economy. Based on the latest figures, the packaged software industry's trade surplus grew from $13 billion in 1997 to over $22 billion in 2000.

Typically for our industry, about half of Bentley Systems' revenues are from export—in this year and last, the larger half. For instance, greater China is already our company's 5th largest market for new software sales!

As software distribution gravitates entirely to the borderless online environment, everyone in the world who stands to gain from our continued R&D has a stake in making sure that TRADE remains free while intellectual property remains protected!

The other policy lesson from software's success is the virtue of avoiding regulatory shackles, which in the case of IT was accomplished somewhat fortuitously as a consequence of constant, rapid change.

For example, could it even be imagined that the entire world would agree to a moratorium on taxation, as has actually happened, for the Internet?

As a close-to-home example of the costs of regulation, I missed this morning's sessions due to the demands of my OTHER seemingly full-time job as the Audit Committee Chairman for a NYSE IT company. Mind you, no one is complaining about doing whatever it will take to actually restore investor confidence-- least of all anyone in the software sector.

However, last month Bentley Systems finally withdrew our IPO registration. Although negative market economics were probably a sufficient factor, frankly the larger issue was the weight of the new and still somewhat unknown regulatory burdens for public companies. The result is that we won't make new investments and employment additions as fast as we otherwise would--a real, if indirect, cost to the economy.

My final observation verges on the political. Even the IT industries are finally prepared to foreswear the extremes of either unreasonable exuberance or post-bubble cynicism, in favor of achievable and incremental evolutionary progress. I actually believe that, in fact, we now can see a rare window of opportunity for ALL significant constituencies to embrace "long-term thinking." In particular, by investing (in preference to "disruptive technologies") in a stable and predictable policy environment-- with a premium on two-way trade and a discount on stultifying regulation-- we can indeed patiently realize sustainable technology-driven productivity increases, and their dividends.

Thank you!