

**The 4<sup>th</sup> Service Transformation: The Algorithmic Revolution  
Prepared for Services Issue: CACM<sup>1</sup>**

© Copyright 2006 by the author

**John Zysman  
Professor of Political Science,  
Co-Director Berkeley Roundtable on the International Economy (BRIE)  
University of California, Berkeley  
Working Paper 171**

---

<sup>1</sup> A version of this article will appear in the CACM Special Issue on Services Sciences, July 2006  
(Communications of the Association for Computing Machinery)

The 4<sup>th</sup> Service Transformation: The Algorithmic Revolution<sup>2</sup>  
John Zysman<sup>3</sup>© 2006

We are in the midst of the 4<sup>th</sup> services transformation. The core story is not about the growth in the quantity or the value of the activities we label as services. Rather, the present story is the application of rule-based Information Technology tools to these service activities. This application has the potential to transform the services component of the economy, altering how activities are conducted and value is created. Services were once seen as a sinkhole of the economy, immune to significant technological or organizationally driven productivity increases.<sup>i</sup> Now the IT enabled reorganization of services, and business processes more generally, has become a source of dynamism in the economy.<sup>ii</sup>

There are four interconnected service stories that must be separated and clarified. The conventional discourse emphasizing the importance of services in the economy often conflates and confuses them. The first three stories are logical evolutions; while the fourth transformation is a moment of real change. The *first service story* is an accounting error, or perhaps better a matter of financial engineering. Activities outsourced from manufacturing were relabeled as services; it is a transformation in where the activities were housed. The GM window washer is a manufacturing employee; but when contracted by GM he now becomes a service employee. Over time, contracting to move activities from under one roof, GM, to another roof, Ace window washers, for example, even if the activity has not initially changed, can have consequences. What begins as a cost issue, coded as “Your Mess For Less” -identical service provided by AceWindows in this example at lower cost due to economies of scale, scope and focus may soon generate higher quality and even create a new trajectory of innovation. The same window is washed, perhaps by the same window washer. Initially, at least, we should assume the activities stay the same, just conducted by different organizations.

*The second story* is about changes in what consumers buy and what businesses use to produce and distribute their products and services. There is a shift in what people consume as their incomes rise and commodity products drop in price.<sup>iii</sup> Services become a larger portion of the consumer market-basket. As important, over time as the complexity of production, management and competition increases, there are more service inputs into “production” in the form of marketing, branding, accounting, lawyering, strategizing and the like. Together the evolution of consumer and business purchases means that services become a larger part of the economy.

The *third service story* is about the transformation in and changing role of women in the workforce and, with that, the conversion of unpaid domestic work – washing floors, watching babies, and delivering groceries – into commercial services bought and sold in the market. Maybe we call it household outsourcing.

---

<sup>2</sup> A version of this article will appear in the CACM Special Issue on Services Sciences, July 2006 (Communications of the Association for Computing Machinery)

<sup>3</sup> John Zysman is Co-director of BRIE and Professor at UC Berkeley. His new book: *How Revolutionary was the Digital Revolution? National Responses, Market Transitions, and Global Technology*, co-edited with Abraham Newman, is published in May 2006, Stanford University Press.

The *fourth service story* is the digital transformation. Service activities themselves are changed when they can be converted into formalizable, codifiable, computable processes, processes often with clearly defined rules for their execution. In search of fresh imagery for a complex process, I call this the algorithmic service transformation, facilitated by IT tools. Much of the innovation then is around the adoption and effective implementation of IT tools. Certainly business processes from finance and accounting through to customer support and CRM are altered when they can be treated as matters of information and data management. Routine and manual functions are automated, and fundamental reorganization of activities is enabled. Likewise, sensors and sensor based networks change many personal services. For example, with sensors and communications, some services such as the monitoring aspects of the home care for the ill, the convalescent, or the elderly can be transformed fundamentally from highly personal activities requiring a continuous presence to a distance activity with sensor data signaling a need for attention. As service activities are conducted by and with IT tools, the worker skills required change as well. Long term nursing in a home is rather different from data monitoring and intervention, and even more distant from the skills to develop the systems in the first place. Different people in different places trained in different ways will be involved. And of course, as information moves, many activities which were previously tightly linked to particular places can be moved.<sup>iv</sup>

Just as important, the algorithmic revolution, the service transformation, blurs the line even further between product and service and shifts the “sweet spot”, the point of differentiated advantage at which distinctive profits can be defended, in the dynamic of value creation. It is conventional to observe that products such as media products are simply encapsulated information. Conversion into digital format facilitates their on line delivery to computers, cell-phones, iPods and the like. Slowly the particular product, the purchase of a CD, blurs into a service, a subscription to download music. IBM has transformed from a company selling a product in which service support provided competitive advantage into a Service company embedding products in its offerings. General Motors makes money from its OnStar Service, even as its business selling the platform for the service, the car, weakens. More generally, for many goods, production itself becomes a commodity service in the marketplace. The services that ride on the product platform become the differentiated asset that creates value for the firm. As this digital service transformation becomes entangled with the struggle by firms to create differentiated assets that command value and strive to avoid the commodification of their core assets, business models are constantly revamped. The drama is that tools and technologies based on algorithmic de-composition of service processes may have the power to revolutionize business models the way manufacturing was revolutionized in the industrial revolution. The spiral continues as the constant organizational reorientation and recombination of activities required by firms to implement or create new business models itself becomes easier as core business processes become services available in the market.<sup>v</sup> The digitally implemented service processes and activities will displace people when it is embedded in automated processes, but the effective use of human insight, intelligence, and knowledge in the choice, development, application, and effective use, of these tools will remain central. The crucial issue in this era will be how underlying knowledge and insight is developed and applied.<sup>vi</sup>

*This 4<sup>th</sup> story* about the transformation of service activities, about the application of digital tools with algorithmic underpinnings to existing activities and the creation of new ones is

just getting underway. Everything changes; what work is, the skills work requires, where work is conducted, how firms organize, and how they capture value.

---

<sup>i</sup> Baumol, William J. 1967. Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis. *American Economic Review* 57.3:415-426.

<sup>ii</sup> Bosworth, Barry P. and Jack E. Triplett. 2004. *Productivity in the US Services Sector: New Sources of Economic Growth*. Washington DC: The Brookings Institution.

<sup>iii</sup> This is show clearly by per-capita income and personal consumption figures constructed from U.S. Department of Commerce, Bureau of Economic Analysis July 2001

<sup>iv</sup> Cohen, Stephen S., and John Zysman. 1987. *Manufacturing Matters: Myth of the Post-Industrial Economy*. New York: Basic Books.

<sup>v</sup> The virtual corporation, some argue, is a mere way station in the transition from the vertical, hierarchical, person-based organization to the SIM Biz company whose underlying activities becoming granular activities available in the market and on line, activities combined in ever new forms as business models evolve. Perhaps an exciting image, but it is a misleading exaggeration.

<sup>vi</sup> See for example: “Spoken About Knowledge: Why It Takes Much More Than Knowledge Management to Manage Knowledge”, Niels Christian Nielsen and Maj Cecilie Nielsen, in *How Revolutionary Was the Revolution*, *Op Cit*.