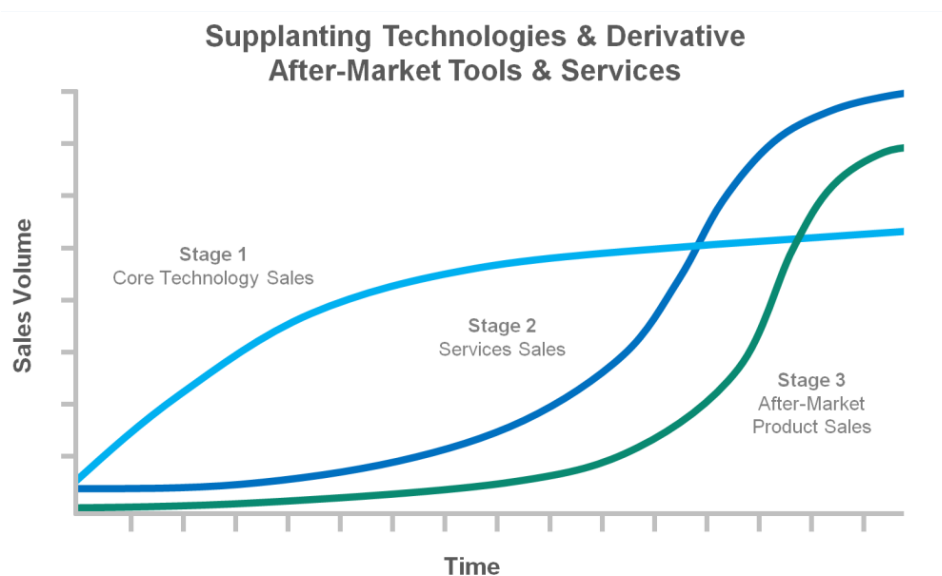


Supplanting [Software] Technologies: Maximizing Market Dynamics to Gain Competitive Advantage

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Automobiles, refrigerators, copiers, computers and relational databases are all industry independent examples of supplanting technologies wherein massive market impact resulted in the replacement of predecessor technologies. They illustrate how supplantation is rapid when the cost benefit is sufficiently compelling and incremental when the transition is complex. Whether developing rapidly or incrementally, however, supplanting technologies all spawn primary as well as derivative secondary and tertiary multi-billion dollar markets in three predictive stages, as shown in Figure 1. In addition, supplanting technologies spawn completely new and original industries, which, in turn, create tangent or confluent markets. Tangent markets are solely dependent on the core supplanting technology and confluent markets are interdependent on multiple supplanting technologies.

Figure 1



Savvy marketers who understand the behavior of supplanting technologies gain abounding opportunities and competitive advantages by maximizing their market dynamics.

First Stage: Initial Market Deployment of the core Supplanting Technology

Deployment of a product into the marketplace (stage one in Figure 1) represents initiation of the supplantation cycle, which can be either rapid or incremental. Supplantation of mimeograph technology with xerography technology was rapid because of the overwhelming benefits of xerography compared to mimeograph technology. There was no value, therefore, for xerography vendors to develop initial interoperable strategies with mimeograph vendors. Relational databases, on the other hand, will

incrementally supplant hierarchical and network database technology because of the complexities, costs and incremental benefits associated with migrating applications from non-relational to relational database technology. Relational database vendors, therefore, should adopt cooperative integration strategies-- gateways, open API's, technology partners, integrations services-- to predecessor hierarchical and network database technologies since relational databases, even today, house less than five percent of corporate data. Very few Fortune 1000 companies today, for example, run their major applications on relational databases, though over the next ten to fifteen years relational databases are destined to become the primary residence for corporate data.

Second Stage: After-Market Services to Support the Core Supplanting Technology

For each type of supplanting technology, there is a corresponding service (stage two in Figure 1). After-market services for rapidly supplanting technologies are maintenance oriented, such as those for xerography equipment. On the other hand, services for incrementally supplanting technologies such as relational databases are integration oriented.

Copiers exemplify maintenance oriented services of rapidly supplanting technologies. For example, once copiers began selling like hotcakes, the copier service business developed to maintain the millions of copiers that went on the blink. Conversely, an incrementally supplanting technology, such as the IBM 360, spawned a huge multi-billion dollar integration and consulting services market wrapped exclusively around IBM 360, IMS, etc. Arthur Andersen and Electronic Data Systems (EDS), for example, grew to be multi-billion dollar companies.

It was predictable, therefore, that after-market services for relational databases would be in high demand-- just as they were for IMS--in order to facilitate relational database application development.

Stage Three: After-Market Products for Core Supplanting Technologies

The third stage (Figure 1) represents the after-market products necessary to support or enhance the core supplanting technology. The demand for after-market products begins to experience rapid growth once the core technology is prevalent in businesses' day-to-day operations. Network monitors, car radios and phones, toner cartridges, RDBMS resource management tools are some examples of after-market products. After-market products fill in the missing gaps of the core supplanting technology. BMC, Pansophic and VM Software, for example, developed and marketed tools to support IBM 360/370-based production applications. Again, it was easily predictable that a similar set of tools would be needed to support production RDBMS-based applications.

The Market Dynamics of the Three Stages of Supplanting Technologies

Understanding the dynamics of the three stages of supplanting technologies is critical. Marketers wanting to capitalize on a new supplanting technology must be adept at predicting when and how to enter a market. Note (in Figure 1) that the rate of change for each subsequent stage eventually exceeds prior stage growth. An example is the SQL integration services, where SQL after-market tools are growing at a faster rate than SQL databases. You can choke, however, if you ramp up too quickly with SQL after-market tools. Even though relational databases were flooding into corporations in the early to mid 1980's, they were in no way running the core businesses for these corporations. It would have been impossible in the early to mid 1980's, therefore, to market a tool for managing major mission critical production RDBMS-based applications, since such applications were too few to support an after-market tools business of any consequence. BMC entered the IMS after-market tools business in 1980, not 1970, when IMS was first introduced into the market. SQL Solutions entered the RDBMS after-market tools business in 1989, not 1981, when the first RDBMS was introduced into the market.

With services, on the other hand, enterprising entrepreneurs can enter the market at stage one to facilitate the early adopters of the new technology, as exemplified by EDS and Andersen. Both exploited the huge service business opportunity emanating from IBM's 360 technology. Similarly, SQL Solutions entered the SQL systems integration business at stage one to provide services for companies using relational databases.

Supplanting Technologies and New Markets: Tangent or Confluent

Supplanting technologies are predictive, evidenced by the consistency with which they evolve through the three stages (Figure 1) independent of industry considerations. They also create opportunities for the development of brand new and unpredictable original industries with huge market potential. These markets are of two types: tangent or confluent. Although tangent and confluent markets are likely to emerge on the heels of a supplanting technology, the industries which spawn confluent and tangent markets are always original and, therefore, unpredictable.

Tangent markets have a sole relationship with the supplanting technology, never progressing beyond their initial dependency. Reproduction/copier centers would not exist were it not for refrigeration. The frozen food business, therefore, is a beneficiary solely of the supplanting refrigeration technology. Similarly, the reproduction business is a beneficiary solely of the supplanting xerography technology. Both exemplify tangential relationships to the core supplanting technology.

Confluent markets have an interdependent relationship with multiple supplanting technologies whereby the supplanting technologies coalesce to create profound technical, organizational and cultural advancements. The external information services business (e.g. CompuServe or Prodigy) evolved from the confluence of multiple technologies-computers, networks and software, as did information services (systems) internal to a business entity. Their impact is so potent that it is forcing management a reassessment of relationships between co-workers, competitors, vendors, etc. In this case, the confluent information services/systems technology creates an opportunity to free organizations from spatiotemporal constraints and build powerful global information-based organizations.

Generally, rapidly supplanting technologies create tangent markets while incrementally supplanting technologies create confluent markets. The tangent reproduction/copy industry materialized as a result of the rapidly supplanting xerography technology. The information services business, on the other hand, materialized as a result of the incrementally supplanting database, network, processor and communication technologies. There is, however, an inverse relationship between the number of participating technologies for a confluent market, and the complexity factor associated with implementation. The more you integrate the more difficult the task due to the inter dependencies among multiple technologies-e.g. operating systems, hardware, databases, communication protocols, networks, etc. Confluent markets, therefore, tend to evolve incrementally because there is an integration intensive period wherein new and old technology must operate in tandem prior to complete supplantation. Consequently, it is untenable to adopt a marketing approach predicated on immediate eradication of older database technology.

Confluent Markets Stimulate New Strategies for Derivative After-Markets

When the impact of a confluent market is profound, its market dynamics create new opportunities to innovate within the derivative markets of integration services and after-market tools. This phenomenon occurred, for example, when the computer industry transitioned to a heterogeneous landscape brought about by networks, relational databases, workstations, personal computers, and departmental end-user computing. Services and tools after-market vendors, as a consequence, could now pursue multidimensional and inclusive integration strategies made possible by the development of

interoperability enabling hardware and software. Thus, the confluent market broadens the landscape of secondary and tertiary derivative after-markets, and, as a consequence, creates new business opportunities for the more savvy integrators and after-market product vendors.

When EDS, Andersen, VM Software, Boole & Babbage, Pansophic and BMC entered the IBM 360 derivative service and tools after-market, their orientation mirrored that of the IBM plug compatible mainframe-centric corporate computing landscape that was specialized and relatively homogeneous. It made sense, therefore, to specialize in one particular area-an exclusive and one-dimensional approach. BMC focused on tools for MVS/IMS while VM Software focused on tools for the VM operating system. Likewise, EDS and Andersen focused on services exclusively for IBM plug-compatible environments. Similarly, on the database side, integrators tended to specialize on one of the following databases: Adabas, IDMS, Total, Datacom DB, Model 204, etc.

When SQL Solutions entered the RDBMS secondary and tertiary after-market services and products business, they pursued an inclusive and multidimensional approach rather than an exclusive and one-dimensional approach. Businesses laden with legacy systems implemented with heterogeneous hardware, software and communications protocols, interoperability architectures and Information Resource Management (IRM).

If corporations, for example, have multiple relational databases as well as non-relational legacy databases, does it not make sense to approach the market from a broader perspective and offer both services and after-market tools for ORACLE, Ingres, Sybase, Informix, Rdb and DB2? If you are going to build a SQL debugger, why not take a "driver" approach and hook into six engines rather than limit yourself to one database engine? Furthermore, why not create a "client/server" debugger that is a service side, it makes sense to break away from the old paradigm of only providing services for one database and adopt a multi-conversant strategy to mitigate companies' heterogeneous headaches.

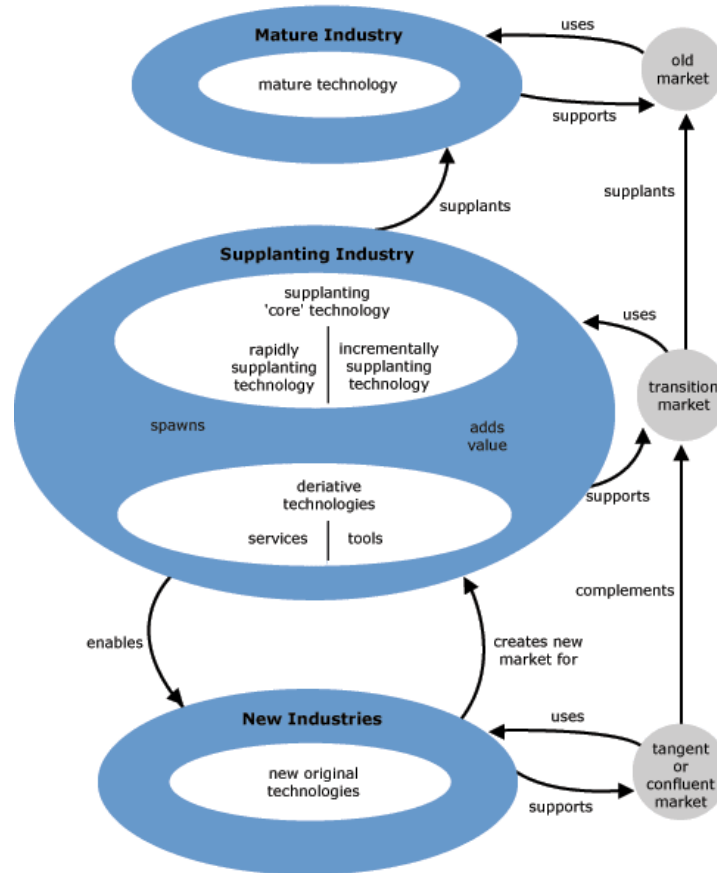
Unfortunately, database vendors, for the most part, have very parochial views vis a vis competition. The prevalent attitude is best likened to little kids in a sandbox-"nyah, nyah, nyah, my database is better than your database!" This puerile approach flies in the face of not only what academia, market analysts, pundits and customers are espousing-non-proprietary, partnering, global, interoperability-but also steeps of smugness and complacency which no one in the software business can afford, as evidenced by the slew of acquisitions in the database arena alone-Cullinet, Ingres, Ashton-Tate, ADR, Interbase, Teradata, Britton-Lee.

Sybase, perhaps, is the first RDBMS vendor to step out of the sandbox. Over two years ago Sybase acquired SQL Solutions, which specializes in SQL systems integration: services and tools for ORACLE, Ingres, Sybase, Informix, Rdb and DB2. Realizing that corporations have multiple relational databases, coupled with Sybase's own open orientation (RPC's, gateways, open API's), it was natural fit to team with a firm that complemented their strategy. Thus, today SQL Solutions actively sells products and services into all of Sybase's competitors' installed base. One doesn't adopt such a strategy to be confrontational or provocative, but rather to service customers. Consider this: if you can present a prospect with a broad experience set that coincides with their environment, not only do you have a skills advantage, but you are positioned as objective and sensitive to the real landscape of corporate computing environments.

IBM and Apple-unthinkable partners two years ago. Sybase and Oracle? If it makes sense, why not? Certainly, if one ponders the dynamics of incrementally supplanting technologies, such as relational databases, it is not inconceivable that a client might turn to Oracle and Sybase to jointly assist them in a global and strategic project. In the not too distant future, teaming with competitors will be standard practice to meet the demands of clients who are pursuing global Information Resource Management strategies to gain competitive advantage. Summary (refer to Figure 2)

Figure 2

Supplanting Technologies: The Relationship Between Industries, Markets & Technology



Supplanting technologies are either incrementally supplanting or rapidly supplanting, as driven by the market. Rapid supplantation occurs when the cost benefit for migrating to the new technology is overwhelming and there are no logistical or technological barriers to conversion. Incremental supplantation, on the other hand, occurs when it is impractical and not cost justifiable to immediately convert to the supplanting technology. As a result, there is a long gestation period characterized by coordination and cooperation with existing technologies.

Supplanting technologies spawn massive derivative integration services and after-market tools to implement and support the core technology. The integration services business eventually grows at a faster clip than core technology initial sales, and, similarly, the after-market product business eventually grows at a faster clip than the integration services. It is important, therefore, for market entry to be timely.

In addition to the three stages (Figure 1) associated with supplanting technologies, massive tangent or confluent external markets are created as a consequence of the core supplanting technology. Supplanting technology after-markets are predictive and derivative. The industries that create confluent and tangent markets, on the other hand, are unpredictable and original. Tangent markets have a sole relationship with the core supplanting technology that never develops beyond a primary dependency. Confluent markets,

on the other hand, are interactively dependent upon multiple supplanting technologies and are often continually influenced by new technologies that add value to the conglomerate of supplanting technologies.

Confluent markets-because of their massive impact upon organizations and culture-can sometimes effect new approaches to the otherwise predictive nature of derivative secondary and tertiary service and product after-markets associated with supplanting technologies.

In the software business two things are certain to occur: commoditization and consolidation. Therefore, survivability is contingent upon innovation, which is necessary to sustain fast growth and competitive advantage. Understanding and then maximizing the market dynamics of supplanting technologies offers a proactive course for achieving competitive advantage.

Figure 2 illustrates the dynamics of supplanting technologies in relation to markets, industries and other technologies. A mature industry is driven by mature technologies and supports older markets, which, in turn, use mature technologies within mature industries. The mature mainframe industry, for example, uses mature IBM/370/IMS technology to upgrade, maintain and service mainframe markets.

Supplanting technologies replace mature technologies either rapidly or incrementally and also spawn derivative service and after-market products, which, in turn, add value to the core supplanting technology. The marketplace in transition uses the supplanting technologies to gain competitive advantage, increase profits and facilitate internal growth.

Xerography rapidly replaced mimeograph technology whereas relational databases are incrementally supplanting hierarchical and network databases. In both cases, large derivative service and product after-markets evolved to add value to the core technology and support the burgeoning market. Copier repair services and accoutrement copier products exemplify derivative after-markets for the supplanting xerography technology.

Additionally, xerography enabled new and original copier/reproduction industries. The creation of the copier/reproduction market is singularly dependent and, hence, tangentially related to xerography. Information services and systems, on the other hand, evolved from the confluence of multiple technologies-hardware, operating systems, communications, relational databases, and networks-and, therefore, create confluent interdependent markets.

Confluent markets are very potent and create opportunities to approach derivative markets in new and innovative ways. The ability to interoperate hardware, software and applications, enabled a new class of integrators and after-market product vendors to gear their products and services to multiple technologies to support emerging confluent markets. SQL systems integration vendors should create after-market services and tools to all major relational databases to help clients build and manage heterogeneous information systems.