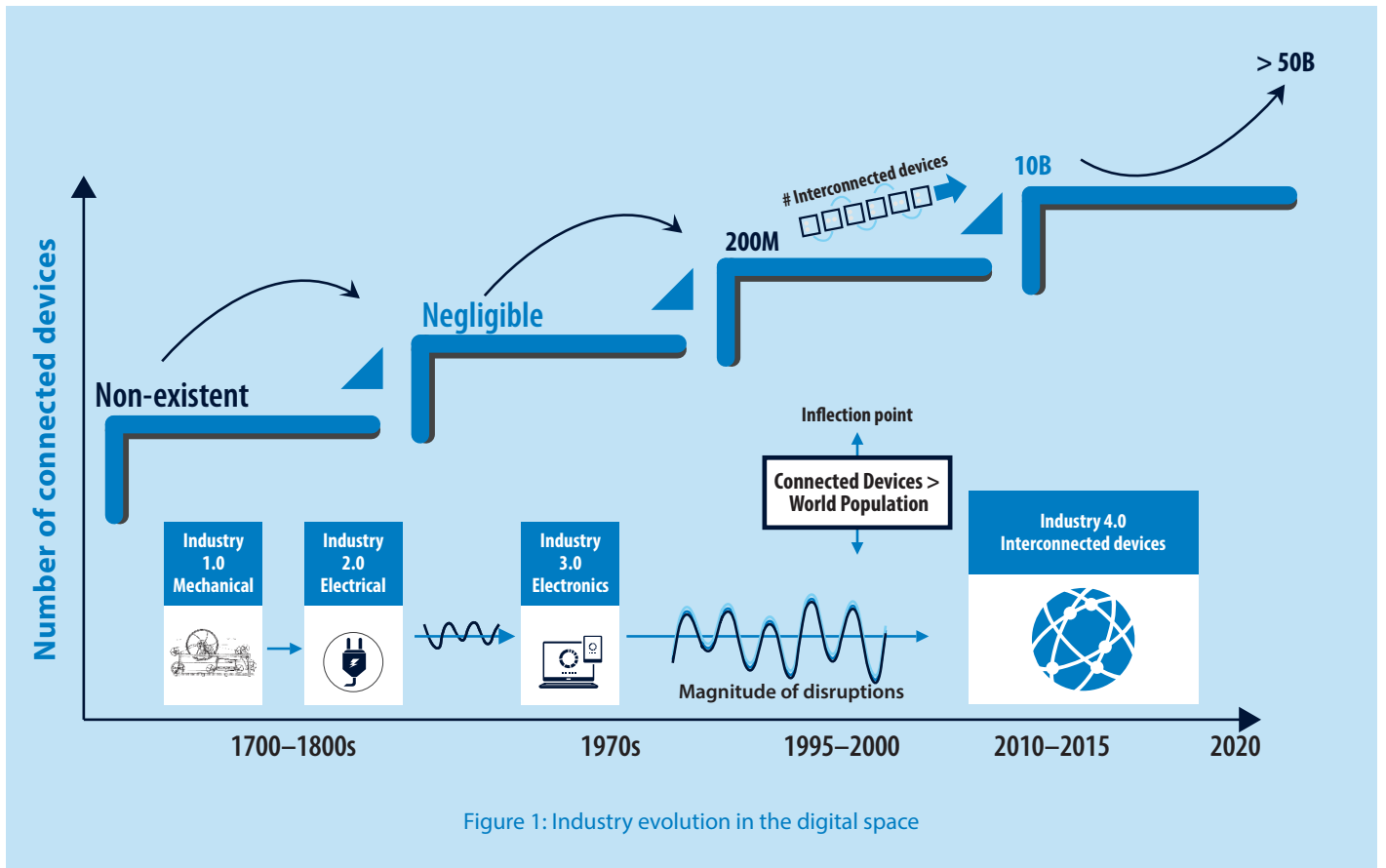


WANTED: FLEXIBLE MANUFACTURING STRUCTURE TO ROLL OUT CONNECTED PRODUCTS

Abstract

As manufacturing finds itself riding on the fourth wave of industrial evolution, it has become increasingly important to understand the exogenous trends in manufacturing and their impact. Infosys experts discuss emerging trends, powered by digital technologies, and how they impact product design for new-age manufacturing.



We have witnessed how demand for customization requires that customer requirements be met in their entirety, while ensuring that inventory placement is flexible enough to handle demand fluctuations and fulfillment. It will require companies to innovate rapidly and explore ways in which product offerings can be made available to customers. Let us now understand how manufacturers are transforming themselves in line

with global consumer trends and digital evolution, thus setting the stage for an entirely new manufacturing paradigm. (See Figure 1)

It is not uncommon to witness manufacturers trying to offer more services on a single, standard hardware platform. There is increased focus on **collaborative manufacturing** to avail of specialized services and dependency on

a **network-based economy**, where the value is added to products and services through digital sources (for example, social networks) for more utilization of idle resources through sharing. These are some of the broad trends that are shaping the traditional concept of product design for manufacturing companies, as they inch closer to dynamically meeting ever-changing consumer demands with smarter investment techniques.

Services convergence: Multiple services delivered on a common platform

The product differentiation approach has been the most compelling change in industrial manufacturing. Manufacturers are gaining an advantage by differentiating software applications while standardizing the hardware platform (See Figure 2). For instance, most smartphones have common external features, making it difficult for customers to differentiate one handset

from another. In such a situation, the user experience, capabilities, and underlying software should address hardware neutrality.

Product customization and bespoke features introduced through programmable interfaces can create a variety of multifunctional products while

influencing the demand for existing products. The transformation of cell phones into multifunctional tools has affected the purchase of products such as wristwatches, calculators, and alarm clocks. Smartphones now also double as remote controllers for TV and media devices, as flashlights, and also as car keys!

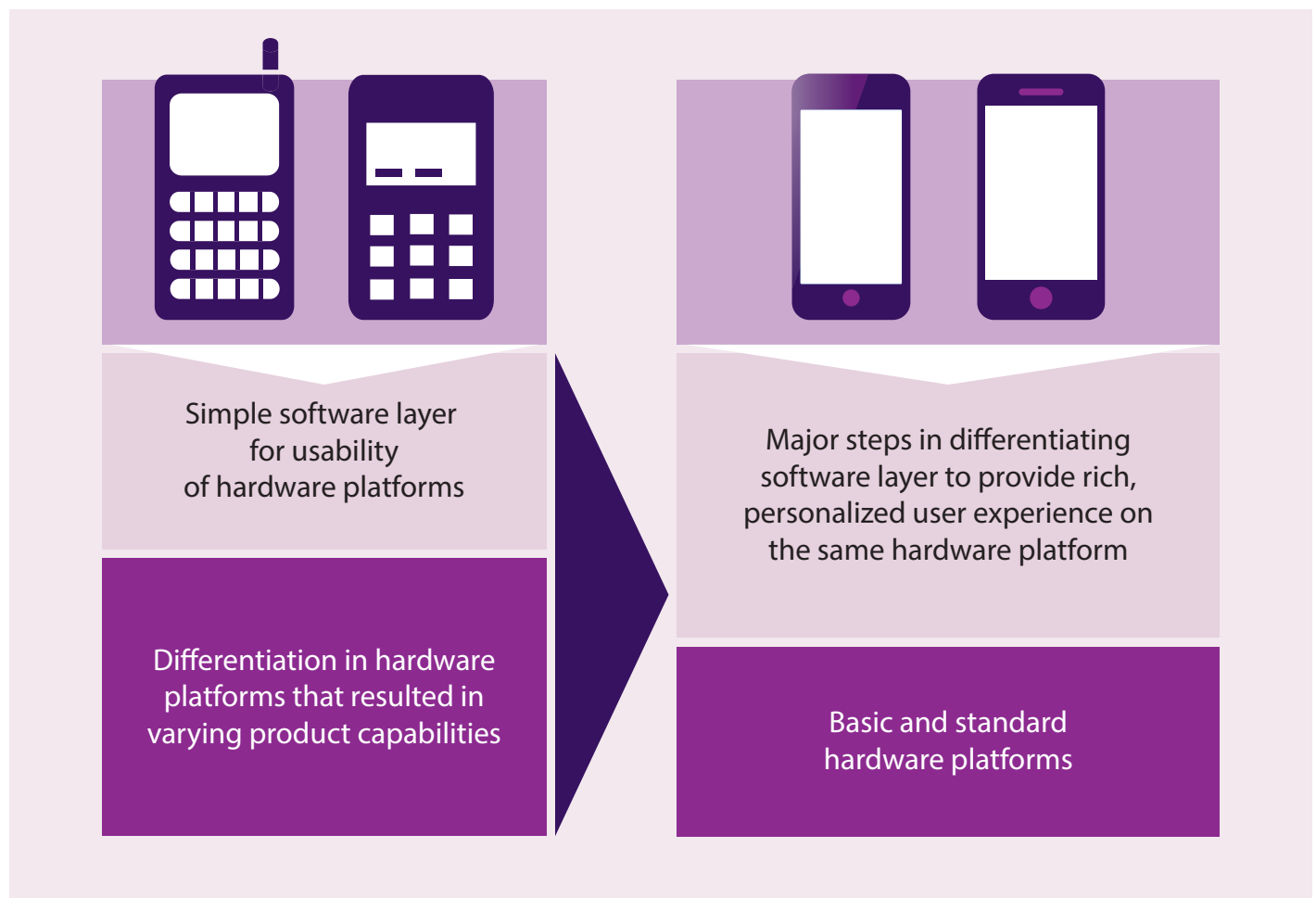


Figure 2: Service convergence on a single platform

Collaborative manufacturing: Specialist services collaborating on a per-project basis

In the film industry, cinematic excellence is the result of collective effort. Actors, directors, producers, cameramen, lyricists, and a host of other professionals work as a group and exit after completing their role in the production and/or release of a movie. Manufacturing companies should adopt the operating model of the film industry. The skills, competencies, and experience of specialists (firms as well as individuals) can be pooled to accomplish specific objectives.

Product life cycles are gradually contracting and product families are becoming irrelevant. To keep up with rapid pace of innovation, accelerated product

launches are warranted. Not too far into the future, flexible manufacturing firms may be formed on need and event basis with contracted specialists and services to generate product ideas, produce these products via rapid prototyping, and sell the product in the market for a specific duration of the product life cycle (See **Figure 3**). Such manufacturing firms will be very successful in selling their products in local markets but might fall short while taking their ideas and products to global markets.

At some stage, the product concept may be subsumed by a larger firm for upgrades and resell, giving way to lean

manufacturing organizations using plug-and-play facilities for on-demand resource requirements with minimal fixed asset investments.

Such a trend was visible during the late 1990s – the period defining the boom, where entrepreneurs with varied experience and expertise came together to form very successful start-up organizations that were targeted towards creating specific products and services. On completion of development and sale of the incubated start-ups to large firms, the team would disband and move on to a different assignment to collaborate with a new set of entrepreneurs and partners.

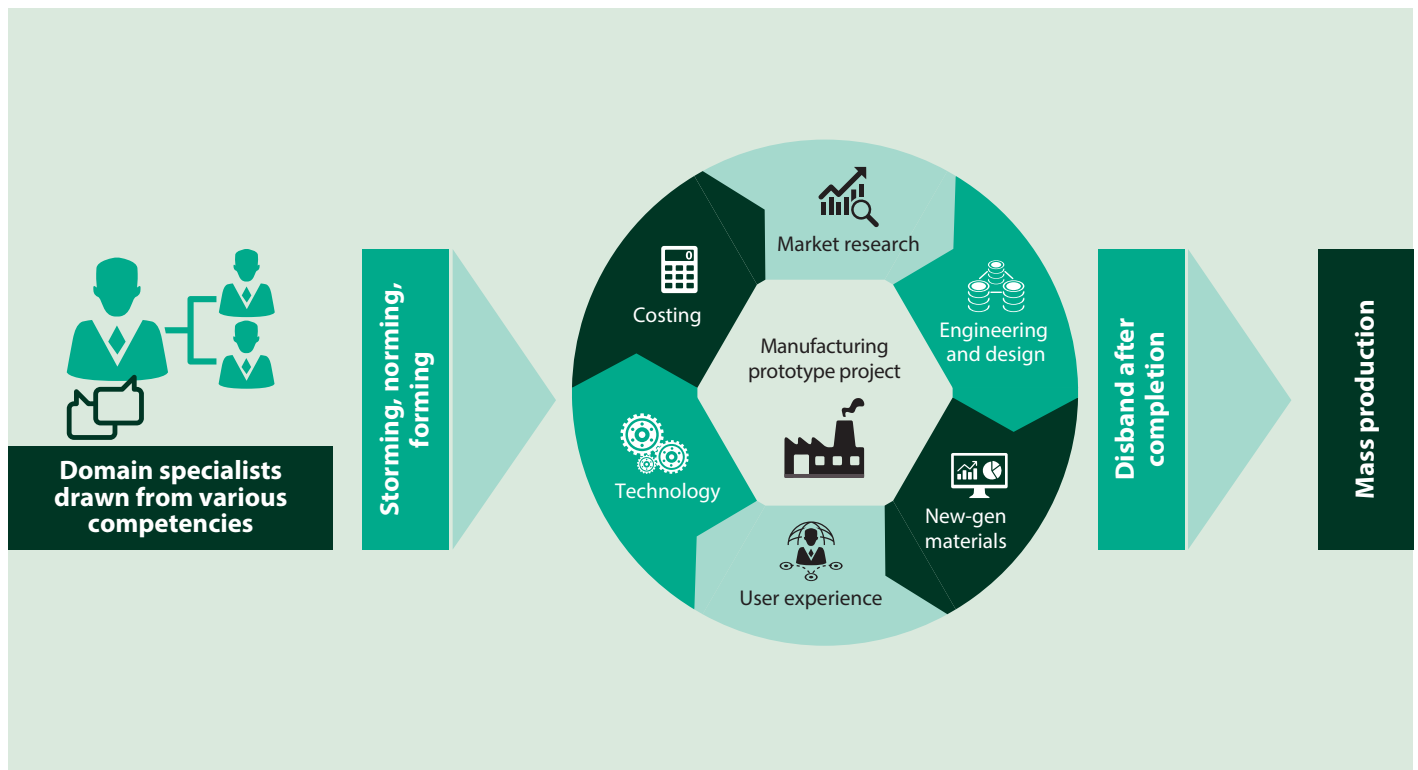


Figure 3: Collaboration of specialist services

Network-based economy: Products as a shared resource

The exponential growth in the e-commerce industry, fueled by the vast internet usage across the world, has given rise to a new category of experts – service and product aggregators – who enable crowdsourcing of ideas as well as on-demand availability of resources (See Figure 4).

Cloud-based applications and social collaboration create borderless manufacturing enterprises. They rationalize the cost of manufacturing futuristic products.

China, referred to as the world's workshop, has long been lauded for its high manufacturing expertise, but is perhaps low on innovation. This belief is slowly being shattered by the local manufacturing centers based in Shenzhen, which have decided to take on the global OEMs, specially the phone companies, by developing their own product designs and production capabilities. The aim is to innovate quickly and cost-effectively as per the demand. Firms in Shenzhen have taken advantage of the 'enabling network'; meaning a company specializing

in production can use the expertise of another firm focusing on product design and R&D. Such a form of social collaboration helps them to achieve rapid exchange of knowledge, which accelerates the overall manufacturing process. Thus, by creating alternative brands, these companies have been able to meet the demands of the increasingly fickle and unpredictable market. The success story of Shenzhen is being replicated in other manufacturing hubs across China; and the same could well be mirrored by manufacturing hubs across the world.

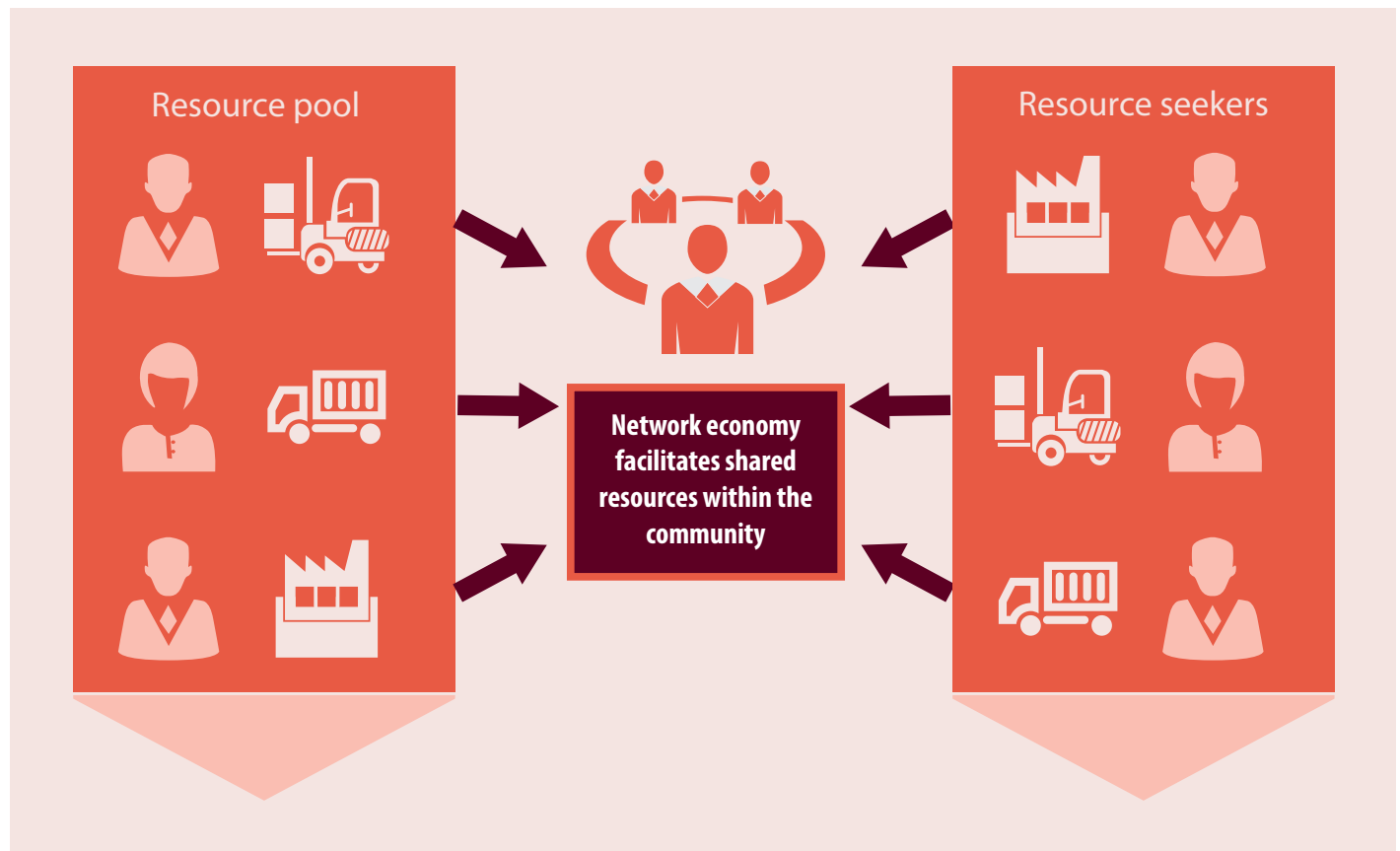


Figure 4: Network economy and shared resources

Pay as you go: Consumption-based payments

Pay-per-use or pay-on-consumption is going to be much more invasive than anything prevalent today. With the usage of cloud-enabled solutions, it is already possible to utilize facilities such as laptop stations or notepads, where the entire data can be stored and accessed via cloud storage and computing mechanisms. Such terminals serve as access points to the personal operating system, as well as work and personal environments through the Internet, leveraging the power of

cloud computing.

In the aviation sector, engine manufacturers like GE and Rolls-Royce have begun performance-based contracts with aircraft manufacturing companies. The idea is that servicing the engines over the long life span of the aircraft brings in more margins than the initial engine sale, to these companies. With this new offering, the customer is expected to pay based on equipment usage

rather than the equipment or service – hence, shifting the focus from paying a high upfront cost to a larger variable component depending upon usage. With real-time data available from the sensors attached to these machines, companies can better predict equipment failures, thereby drastically reducing unscheduled downtimes. Also, analysis on these data points becomes a key consideration for future product designs. Hence, in the long run, subscription-based payments become beneficial to both parties.

Implications

With contracting product life cycles and with product demands becoming more customized, agile, on-demand methods of manufacturing are becoming the need of the hour. Product design in the high-tech manufacturing sector is largely centered around differentiated software deployed on standardized hardware platforms. For discrete manufacturing, the trend is specialized collaborative

manufacturing for product design with mass production and marketing handled by larger corporations or factories, as is prevalent in the pharmaceutical industry. Consumer behavior and usage patterns are also changing with community usage products, and pay-per-use products are becoming more popular with smart planet initiatives and environmental awareness.

While traditional mass manufacturing will still be required, a new paradigm of manufacturing is evolving. It is created by the confluence of the ability to predict consumer demand, the presence of digital technology that enables firms to rapidly produce and satisfy dynamic market demand, as well as co-creation of specialized products that can be swiftly mobilized across markets via marketing by multinational companies.

Traditional pharmaceutical companies have adopted this model, with specialist companies focused on drug discovery and research while drug manufacturing and distribution is undertaken in-house. The time has come for other lines of manufacturing to adopt this paradigm. Speed-to-market with a carefully crafted business model to capitalize on these trends will be critical to the success of manufacturing firms in the future.

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