LOG206: E-Business

Spring 2018

Notes

Module 4: Digital Business Technology Platforms

Introduction

Regardless of the type of digital business, enterprises require technology components to support the new capabilities and models. A digital business technology platform is a interdependent collection of technology capabilities and components that enable a business to create, deliver and capture value. Digital business technology platforms constitute infrastructure necessary for digital business, that is combination of hardware, software applications, networks used to deliver services to employees, partners, and customers. Defining an adequate technology infrastructure is vital to all companies adopting digital business.

Digital tyechnologies increasingly allow the creation of new business designs by blurring the boundaries between the digital and physical worlds due to the convergence of people, business and things. As such, digital business technology platforms must serve key stakeholders representing these spheres, namely: customers, employees, partners and things.

Key Digital Business Technology Platforms

Based on their role, digital business technology platforms can be grouped into five categories namely information systems platform, customer experience platform, data and analytics platform, internet of things (IoT) platform, ecosystems platform. These are described through the lens of applications and business capability components.

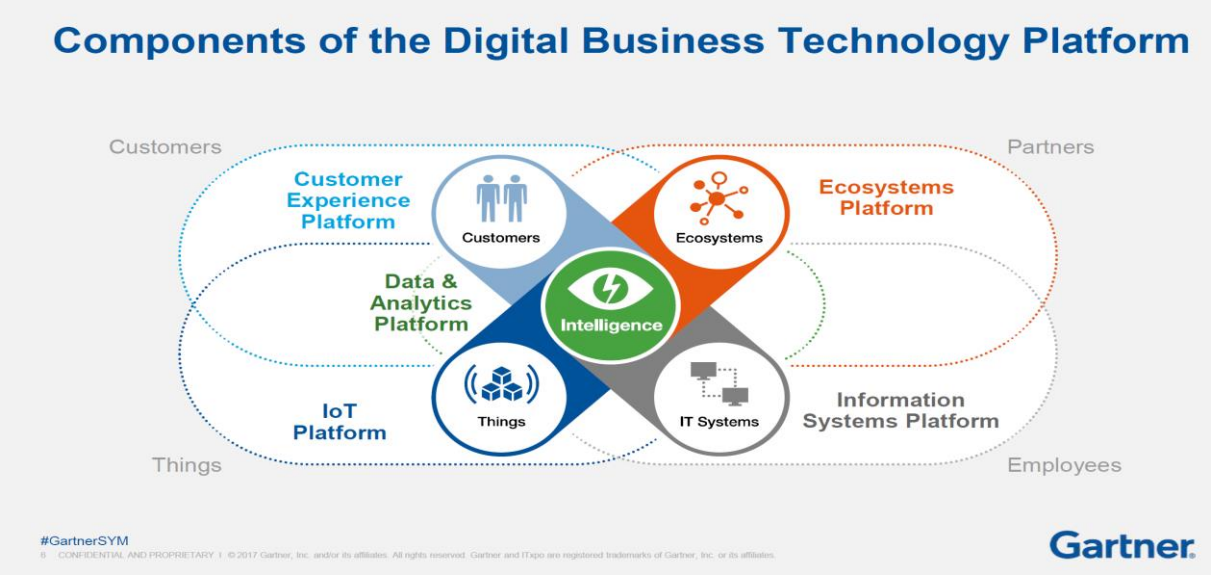


Figure 1: **Digital Business Technology Platforms (**Source: Gartner, 2016)

Components of the information systems platform

The purpose of this platform is to run the back-office and core systems and thus enables employees and core business processes. It includes the following components:

■ Employee collaboration and workplace — Email, telephone and video, file storage and sharing, collaboration tools, productivity tools, employee apps and personal employee apps are all part of the tools used by employees in the digital workplace.

■ Back-office systems — These include finance, HR, purchasing, billing and other vital backoffice systems. Systems of record for master data are also included. Usually, these back-office capabilities are delivered by an ERP system and "bolt-ons." For certain domain areas, like HR, these systems are shifting to the public cloud to support a pressing need to better attract and retain talent or optimize procurement or logistics.

■ Core systems — Each industry has a set of core systems (e.g., core banking and core merchandising). The terms core vertical systems, industry applications and vertical IT systems are also used to describe core systems in this report. Examples include provisioning systems in telecom, actuarial systems in insurance, and supply chain and warehouse systems in industrial sectors. Industry-specific versions of ERPs and best-of-breed industry solutions often provide these capabilities.

■ Supplier portal and apps — These are used by vendors to transact, view and change orders electronically. Mobile apps and websites usually deliver the portal user experience, while an underlying layer uses industry standards to conduct transactions and connect to supply chain hubs. Supplier portals can evolve to become full-scale ecosystems.

■ Endpoint computing — An endpoint deviceis an Internet-capable computer hardware device on a TCP/IP network. For example desktop computers, laptops, smart phones, tablets, thin clients, printers or other specialized hardware such POS terminals and smart meters.The endpoint devices and the security and management tools that support them are part of information systems platform. The placement of endpoint computing in Figure 2 denotes the progressing convergence between endpoint computing and IoT.

■ Operational technology (OT) systems — Although not part of the traditional IT landscape, these operational systems directly control and monitor equipment and assets. For example, in manufacturing, they can be industrial control systems or supervisory control and data acquisition (SCADA); in utilities, they can be energy management, substation automation or SCADA systems; and in healthcare they are the clinical systems and technologies. Manufacturing execution systems, fleet telematics and telecom network equipment are also examples of operational technologies.

The Customer Experience Platform

The purpose of this platform is to run the technology that enables interaction and commerce with customers (B2C, B2B, B2B2C) and citizens. It is the gateway to interaction and transaction with customers.

■ Customer portal and apps — Customers use them to gain information, get customer service, apply for services, place orders and transact, and/or view status. For public-sector enterprises, these are often citizen portals and apps, and for other enterprises it can be a website or app.

For retailers, it is often their e-commerce site and apps. Customer portals can evolve to become full-scale ecosystems.

■ Back-office systems — See description in the Information Systems Platform section.

■ Social networks — Enterprises often need to be able to participate in social networks for community interaction and transactional (e.g., commerce and payment) functions. The customer experience platform needs to be able to support this by enabling the posting of data (feeds) and by receiving data (e.g., customer questions from Facebook). It can also provide a mechanism for employees to engage with customers or constituents to improve experience. Data, metadata and aggregated data from social networks can be used to do customer analytics.

■ Customer analytics — Customer data can be accessed from all internal and external sources (e.g., CRM, purchased data, social networks, ERP and mobile app). Enterprises will use analytics ranging from simple historical analysis and segmentation to demand analytics and advanced social sentiment. Customer analytics can be diagnostic, predictive and prescriptive (e.g., customer offer engine). The output/results of customer analysis can be fed to any other parts of the technology platform.

■ Multichannel interaction and commerce — This set of technology solutions enables customers to look up information, request services and do any of the activities associated with e-commerce, regardless of interaction channel. Ideally, these customer activities are API-based and can be combined to form any customer-facing process across any channel. Presentation layer and any channel-specific constraints and opportunities are supported in this set of technologies. Multichannel interaction and commerce can be B2C, B2B, B2B2C and citizen facing.

Things to consider when building a customer experience platform:
■ Multichannel capability is critical. Many enterprises strive for the principle "build once and deploy to any channel." This requires a disciplined services-based approach and a focus on continuous experience to ensure that customers remain engaged.

■ The customer experience platform is, in many ways, the gateway through which other platforms (e.g., IoT and information systems) provide communication and value to the customer. Ideally, inbound data, insight, requests and commerce, as well as outbound information and fulfillment of services go through the customer experience platform.

■ The enterprise having a "single view of the customer" is as important as the customer having "a single view of your enterprise." For example, customers should be able to walk into a branch, store or service center and ask about transactions and service that were done on a mobile app. This requires fluid integration of products/services/channels, and an outside-in, customer-centric mindset for development.

The IoT Platform

The purpose of this platform is to connect endpoints such as physical assets and consumer things. The platform enables the monitoring, management, services and security of these things and thus it serves to leverage connected things. The platform also brings together the connected things with existing IT and OT systems to enable further value.

The IoT platform contains:
■ Connectivity to enterprise-owned things — An enterprise has a whole set of heterogeneous assets it owns and uses. Factories have manufacturing equipment, hospitals have medical equipment, retailers have vending machines and store equipment, and so on. The IoT platform provides connectivity to this equipment, and should be able to handle many different data and wireless standards.

■ Connectivity to customer-owned things — An enterprise will want to be able to connect to their customer's things. For example, an engine maker will want to offer connectivity services to its customers to monitor/optimize the engine. Consumer goods (e.g., appliances and electronics), automobiles and many other consumer-owned things should be able to connect to an enterprise's IoT platform. Scale, security, cost, and privacy and ethics will be major factors in connecting customer-owned things.

■ Connectivity to partner-owned things — An enterprise uses assets that it leases or that are operated by partners. For example, fleet trucks and vehicles are often owned and operated by third parties, yet enterprises want to be able to connect to them to receive the data about their usage (e.g., location or diagnostic information). The IoT platform should also serve as the gateway to relevant data from partner-owned things.

■ IoT analytics — Data from things and assets provide valuable use cases such as optimization of assets (e.g., use less fuel, obtain better yield) and insight on usage (e.g., driving patterns or healthcare signals). The IoT platform can be used in two ways to support these. First, the IoT platform can simply act as a gateway to analytics and storage capabilities that exist in the data and analytics platform. Used in this way, the IoT platform is analogous to an extraction, transformation and loading (ETL) tool. A second option is to do some or all of the data monitoring, storage, analytics and algorithms in the IoT platform. Most IoT analytics use cases will be a mix of these two.

■ OT systems — See description in the Information Systems Platform section.

■ Core systems — As explained in the Information Systems Platform section.

■ Endpoint computing — As explained in the Information Systems Platform section.

Things to consider when building an IoT platform
■ An IoT platform is usually the fourth major platform that thing-/asset-dependent enterprises implement (after information systems, customer experience, and data and analytics). It is often a completely net new addition to an enterprise's technology landscape.

■ An IoT platform augments OT systems, it does not replace them. OT systems will always provide the real-time performance, reliability and security required by operational assets. The IoT platform augments OT systems by providing better ways to collect, store and analyze data. The platform provides selective interoperability and scalability between heterogeneous things. It provides ease-of-use capabilities to OT systems such as the ability to create mobile apps or APIs. For OT-dependent assets, OT systems remain the foundation, while IoT platforms provide the augmentation.

■ When standardizing to eliminate silos, much of the middleware to connect things to OT and IT systems will be concentrated in the IoT platform. Once things can communicate with IT systems, a number of valuable capabilities emerge. For example, malfunctioning assets can automatically create a service request in asset and core systems, or a vending machine can create a replenishment order in a supply chain application. The IoT platform also provides additional capabilities to OT systems and assets. For example, even though a machine may have been connected to an OT control system for decades, the addition of an IoT platform extends the ability to create a mobile or tablet app to view diagnostics — effectively adding a more modern window into parts of the OT control system.

■ The architecture for an IoT platform can be centralized or highly distributed. Enterprises are adviced to choose architectures that meet the realities of their environment. For example, consumer things will often use a cloud-centric architecture, whereas field assets will want thing- or gateway-centric architectures that keep data, analytics and computing power in the field — and only selectively rely on central cloud services. Refer to "Build Your Blueprint for the Internet of Things, Based on Five Architectural Components" for details about these architecture styles.

The Ecosystems Platform

The purpose of this platform is to enable an enterprise to create value from the outside with other actors in the digital world. This requires the ability to make assets like data, algorithms, transactions and business processes available through APIs to external business ecosystems; to construct ecosystems that an enterprise can host to connect new partners and developers, and to pursue new business models; and an ability to connect to industry ecosystems such as marketplaces, supply chain hubs and financial networks. It also requires organizations to think about the relationship between internal, private and public APIs to unlock new revenue opportunities from existing services and information.

The ecosystems platform contains:

■ Customer-facing public APIs — These external-facing APIs are to be used by customers or other partners in customer-facing roles. For example, some large retailers have created APIs for functions such as "check inventory" and "get product description." Banks have also created public-facing APIs to check account balances so that a third-party app (with the security) can access the balance. Governments share public data via APIs for open data initiatives. These APIs are not applications or apps — they are a key functionality to be used in external applications, apps and websites.

■ Partner-facing public APIs — Similar to customer-facing APIs, these are designed to be used outside the enterprise, but for partners instead of customers. For example, insurance companies can create rating APIs to be used by brokers' apps or websites to price out premiums. Consumer goods companies can provide APIs to retailers so that they can get the latest product data or current inventory levels. Again, these APIs are not applications or apps — they are a key functionality to be used in external applications, apps and websites.

■ Enterprise-run ecosystems — Enterprises can build their own ecosystems that can be commercial or community-based in nature. The ecosystems platform provides the technology foundation to do so. For example, an enterprise may want to create a buyer/seller/third-party marketplace for products (e.g., eBay, Amazon) or services (e.g., Uber or Airbnb). A commercial ecosystem could also be financial in nature, allowing lenders and borrowers to

interact and transact. Some enterprises may want to build and run an external ecosystem that is noncommercial, and more community-based. For example, many smart cities must deal with a multitude of connected needs, such as waste management, water quality, traffic, parking and so on. Creating a smart city ecosystem allows the various providers and departments to connect to a single community. The ability to create social graphs, feeds, monetization engines and algorithms that link supply with demand (e.g., recommendation engines) are some of the main capabilities of this platform.

■ Industry- and vendor-run ecosystems — Most industries have several different hubs, communities and networks that bring together players in the value chain. For example, supply chain hubs, credit card networks, retail marketplaces, B2B marketplaces, payment networks and coupon clearinghouse networks are all good examples across various industries. In many ways, these are external ecosystems run by an industry consortium or third party. Another class of external ecosystems is those run by partners such as technology vendors or suppliers and customers. For example, technology vendors like Intuit and SAP run a number of ecosystems (e.g., Intuit's financial APIs and SAP Ariba e-marketplaces). John Deere runs JDlink to connect partners and agricultural equipment. Enterprises participate in these external ecosystems. The technologies that connect and allow interaction and commerce to occur are part of the capabilities of an ecosystem platform.

■ Customer and portal and apps — This area is usually one of an enterprise's first outreach to external ecosystems (e.g., to a vendor, Walmart's Retail Link can be considered its customer's ecosystem). See description in the Information Systems Platform section.

■ Supplier portal and apps — This area is also one of an enterprise's first outreach to external ecosystems (e.g., to Walmart, its Retail Link can be considered a vendor ecosystem). See description in the Information Systems Platform section.

■ API management software — Proper management, security and governance are critical for an enterprise's APIs that will be public-facing and APIs from partners that will be employed by the enterprise leveraged by a business ecosystem that, for most enterprises, will include employees, customers and partners. API management solutions fulfill these tasks. Banks, retailers, governments and any kind of enterprise can extend their capabilities into the digital world via APIs. For example, a bank may want to allow customers to check their balance or make payments via its partners (e.g., a personal financial management app or an online marketplace payment). A city may want to consume the API from the private company that manages its bridges, so that the city can display the number of lanes open on the city's app. The API management software can make APIs available to business ecosystems and integrate with APIs outside of the enterprise. It serves both incoming (from external providers) and outgoing APIs (from the enterprise's public-facing APIs), and it provides a mechanism to encourage development of new services and to manage usage of APIs.

Things to consider when building an ecosystems platform:

■ The ecosystems platform will be linked to all other platforms. All other platforms will use the ecosystems platform as a way to digitally interact and/or transact with the external world. In many ways, the ecosystems platform serves as the gateway and host to the external world. As such, the strategies need to be connected, and organizations need to have an integration strategy that enables business flexibility.

■ The API management software is the vital component of the ecosystems platform, and is

used to manage and control internal, private and public APIs. Internal APIs are for employees; private APIs are for customers (especially B2B) and partners but are not published or used publicly; and public-facing APIs are for partners and customers, and are designed to be discoverable, published and used publicly.

■ Enterprises should be sure to include the ability to discover external APIs being used by an enterprise, or APIs being exposed publicly as part of your architecture. Monitoring of usage for value realization, cost and security is an important function.

■ Many enterprises will not want to build an ecosystem — a perfectly sensible option. However, all enterprises will want to have access to external APIs or to expose their own publicly. In this situation, think of the ecosystems platform as more of an API platform that allows participation in the external digital world of APIs and partner ecosystems. This is especially important when you are not in a dominant market position and different customers insist on participation in their unique ecosystems.

■ For those enterprises choosing to build their own ecosystems, note that an ecosystem can be a hybrid combination of commercial and community-based needs. Remember that technology and architecture decisions need to be made in context to the nature of the business relationship dynamics. Flexibility should be a key design paradigm.

■ Ecosystems are best designed to bring fragmented supply to a fragmented demand base (e.g., Airbnb, Alibaba or LendingTree). However, one of the key differentiators between ecosystems is the simple front-end experience that hides the complexity of the highly fragmented market it serves.

The Data and Analytics Platform

Data permeates all platforms. The central position of the data and analytics platform (at the intersection of all the other platforms) reflects this. The purpose of this platform is to provide the context for compliance and reporting; real-time event analysis and adjustments to processes; data and models that allow decisions to be made; and algorithms that automate decisions and prescribe courses of action that can be executed in all of the platforms. Each part of the data and analytics platform can deliver insight that is descriptive, diagnostic, predictive and/or prescriptive.

The data and analytics platform contains:

■ Partner and supplier analytics — Enterprises must be able to analyze the services rendered and products delivered by vendors and partners. Supplier fill rates, broker-dealer/agent performance and partner fraud analysis are all examples of insight that will help the enterprise. Multitier supply chain visibility and analytics are also examples of capabilities in this area. Data that feeds partner and supplier analytics can come from internal sources as well as partner/ supplier/third-party sources. This also includes data procured from the rapidly expanding landscape of data brokers and open datasets.

■ Business and operational analytics — Insight derived from operations and business functions is critical to all parts of the enterprise. The analyses can be financial, market-focused and process-focused. Sales, production and process analytics often form the most common type of analysis. Most of the data for these types of insights will come from core

system and backoffice sources, which may be complemented by other sources.
■ Algorithm engines — Algorithm and analytics modelling workbenches are becoming an important capability for enterprises. These sets of tools create and then run the algorithms used in all parts of the enterprise (e.g., customer offer engines, fraud detection engines and predictive maintenance). Although centrally positioned in the figures, algorithms are used throughout all of the platforms.

■ Business intelligence — This includes reporting, dashboards and online analytical processing (OLAP) analysis of back-office and core system data. These tools are used for historical reporting through to advanced decision making. The presentation layer can be anything from web and mobile to sophisticated interactive visualization. This data is becoming available to an ever wider corporate audiences (self-service portals), allowing more sophisticated analysis, such as forecasting. They can be deployed as a part of other systems (e.g., HR, CRM, ERP) or across various applications.

Things to consider when building the data and analytics platform
■ Data, analytics and algorithms are central to the digital business platform, and must be driven by a data and analytics strategy.

■ The data and analytics platform should be viewed as a layer of infrastructure that the other platforms will draw on for external data and analytics, and that will use internal data and analytics to execute its functions.

■ The democratization of data is well underway. The data and analytics platform must include self-service for increasingly wider constituencies in your organization.

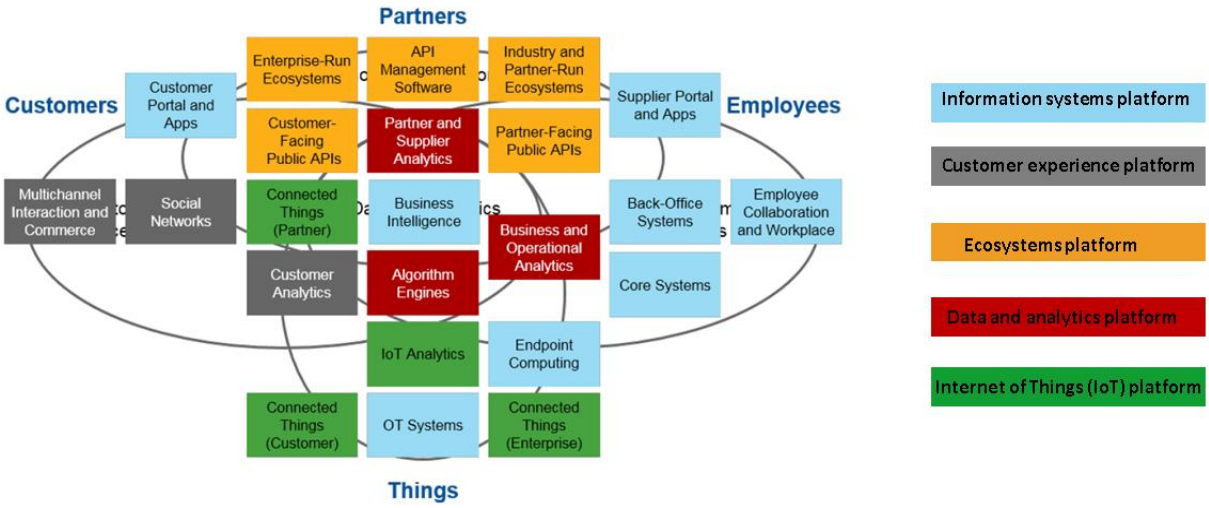
■ The implications of data and decision democratization include a variety of deployment options, simplicity of use and ever more sophisticated ways to represent data, such as visualization.

■ Data quality is a key underlying success factor. The data itself must be analyzed in order to determine whether it is accurate, complete, timely, and fit for purpose overall. Data quality metrics must be built in or overlaid on any transactional or core systems that are being used for analytic purposes.

■ Data governance, which includes an assessment of data quality, processes and methods for creating and maintaining data quality via policy creation and application for use by data stewards and other business-based data roles, is a necessary component of data and analytics platforms.

■ Companies that want to successfully create information value show consistent traits. They optimize existing infrastructure in Mode 1 and prioritize initiatives, such as customer analytics, that focus on business benefits. They also shift focus away from vendors and tools, and toward a blend of common and unique information capabilities.

The Complete Digital Business Technology Platform



Source: Gartner (June 2016)

Reference

Hung LeHong, H., Howard, C., Gaughan, D., and Logan, D. (2016). Building a Digital Business Technology Platform. Research report. Gartner.