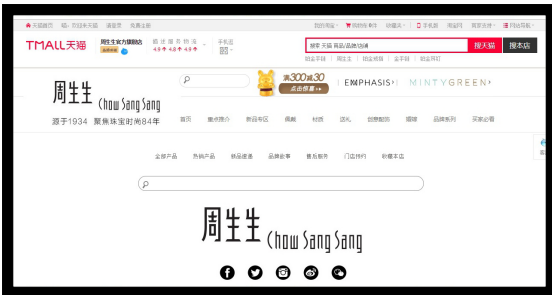


Hong Kong's famous jewellery company, Chow Sang Sang, with its brand name derived from the Chinese classic philosophy " Yi Jing": "It grows continuously, and the cycle keeps repeating." Chow Sang Sang maintains its enthusiasm for jewellery, not only insisting on maintaining the tradition of excellent quality, but also instilling innovation and creativity.



## Chow Sang Sang's Digital Transformation, Together with Pivotal on Road to Agile Development

Over the past 80 years, Chow Sang Sang has made many achievements, including becoming the first jewellery company listed on the Hong Kong Stock Exchange in 1973; the first Hong Kong jewellery company to break through tradition and launch the theme series - Hello Kitty Boutique Series in 1997; and the first Hong Kong jewellery company to establish a brand website and online store in 2001.



Chow Sang Sang emphasizes on online sales channels and actively participates in e-commerce platforms such as Tmall and Jingdong. Chow Sang Sang's online sales continued to grow, reaching 14% of the mainland sales in 2017. Chow Sang Sang actively carried out a digital transformation in 2018 and cooperated with Pivotal, a software company of Dell Technology Group, to support operational integration between physical and online channels, by adopting the latest Pivotal Kubernetes Services (PKS) containerized infrastructure.

"Chow Sang Sang's digital transformation and cooperation with Pivotal is a milestone." Mr. William Poon (Mr. Poon), CIO of Chow Sang Sang, mentioned that Chow Sang Sang developed its website using SAP Hybris's stand-alone architecture 10 years ago. In recent years, he has determined plan for digital transformation and is constantly thinking of how to implement it. IT resource is the core driver for transformation. Therefore, Chow Sang Sang cooperates with Pivotal, VMware and Dell to establish an integrated private and public cloud platform. DevOps automation is therefore realized, from software development to operation, with agile IT to catch up with the business transformation.

The Pivotal logo, consisting of the word "Pivotal" in a bold, teal, sans-serif font, with a registered trademark symbol (®) to the right.

### Challenges From Digital Transformation

Customers are becoming more savvy, because of existence of e-commerce channels. Mr. Poon said Chow Sang Sang began to actively enter channels of Tmall, Jingdong and Vipshop 8-10 years ago. Although sales grew rapidly, it brought challenges to physical stores. Since customers can easily obtain product and price information from different e-commerce channels through the Internet, they like to browse products online, and go to physical stores to see the real products, listen to salespersons, and afterwards go back to online channels to purchase. Salespersons therefore do not have the incentive to serve such customers.

For physical stores, there is a problem of reduced enthusiasm for salespersons and sales revenue cannot be obtained, since store customers will eventually buy products from online channels. To solve this problem, Chow Sang Sang tries to integrate physical stores with online channels, by combining sales process from physical stores and tracking the online sales results. Contributions from physical stores in the sales process can therefore be calculated, so that physical stores can share with the sales results from online channels. This is the new omni-channel concept proposed by Chow Sang Sang.

System change and integration between physical and online stores are not simple. It is an omni-channel coverage, which requires company's IT to be agile and meet the speed of business change. In addition, e-commerce partners are also in a state of rapid change. For example, retail of Jingdong cooperation from the physical stores. Besides, customers can enjoy a reward program on Chow Sang Sang's website, it is part of the internal CRM system. Therefore, the ever-changing business and IT needs of shopping, online stores, CRM systems, etc., requires a new generation of microservice architecture. This is the reason why Chow Sang Sang chooses PKS and seamlessly integrate between private and public clouds through the PKS+Pivotal BOSH platform. Business system can be combined and business needs can be met.

### Omni-Channel IT Platform

Chow Sang Sang is building a new generation of omni-channel sales platform of integrated physical and online stores. It requires the company's agile IT to support business. In the past, the system used to be a stand-alone system. But nowadays, system connects with Internet companies and development of Internet services including online stores and e-commerce, Chow Sang Sang needs to have a full-cloud architecture, such as splitting a large Oracle library into an independently expandable distribution of database, etc.

Pivotal provides a modern agile development process and cloud native platform that can be deployed on every private and public cloud. Pivotal's cloud native platform supports the full lifecycle of cloud native applications from development, testing to production. In addition to the Pivotal Cloud Foundry cloud native PaaS platform, it also provides data platform solutions represented by Greenplum and Gemfire. In the agile IT architecture, containers are an indispensable technology and foundation for microservices. Pivotal Cloud Foundry offers PKS, the Kubernetes-based enterprise-level solution, for running containerized workloads. In addition, important services including Greenplum, can be operated in a container to run on PKS.



PKS (Pivotal Container Service) is a collaboration between Pivotal and VMware. PKS is based on Google's open source Kubernetes container technology, which is a commercial version of Kubernetes. The biggest benefit of PKS is that it can be seamlessly integrated with VMware software, allowing companies to use VMware's unified SDDC infrastructure for containers, while PKS itself can continually compatible with Google Container Engine (GKE) and support for the latest version of Kubernetes.

Mr. James Tso, CIO of Masterson Technology Limited, Chow Sang Sang's IT partner, said Kubernetes is complicated and there are still many problems with the open source version. PKS solves these problems by providing a simplified installation experience and an automated Day 2 operating experience, a zero downtime upgrade is provided. With the PKS integration platform, companies can implement DevOps without spending too much effort on development and operation management. PKS automates operation of Day 2, especially collaboration between VMware and Google to update new version of Kubernetes without downtime of production system.



PKS runs open source Kubernetes on Pivotal Cloud Foundry BOSH, this is a configuration and automation platform. BOSH abstracts the complexity of multiple private and public cloud infrastructures, in addition to GCP, it can compatible with AWS, Alibaba Cloud, and other public clouds and hybrid clouds from Openstack and VMware vSphere. BOSH solves automated management of cloud resources for container applications, and automated operation and maintenance of Kubernetes clusters in production environments.

Chow Sang Sang's next-generation IT system is based on VMware SDDC's private cloud software and the full-cloud platform implementation by Dell EMC hardware, which is a Pivotal Ready Architecture PRA. This comprehensive cloud solution from Dell Technology Group, provides Chow Sang Sang with omni-channel IT resources, which laid a good foundation for Chow Sang Sang's next digital transformation.

## The Road to Agility

Chow Sang Sang has three DevOps teams in China, Hong Kong and Taiwan. As business changes rapidly, it is necessary to carry out simultaneous development of the three teams. Each team should independently develop different dimensions. Integrating the overall operation and maintenance, this is very demanding in all aspects. The quality of a microservice will affect the entire IT ecosystem. From May 2018, Chow Sang Sang teamed up with Pivotal's partner, Masterson Technology Limited, to use complete Pivotal platform and agile methodology, adding with the automated CI/CD development and operation. It laid a foundation for agile development for Chow Sang Sang.

Mr. Poon stressed that PKS is a flexible platform and implementation speed is very fast. It was completed by 2018. Other solutions have been considered before, but they do not have the comprehensive coverage from container to software and hardware. PKS+VMware+DellEMC's solution allows Chow Sang Sang to have a unified interface, and problems can be quickly located. This is not possible with other open source solutions.



In addition to PKS, Chow Sang Sang's current agile development mainly uses Spring Boot+ Spring Cloud development environment, which is an open source development operation and maintenance framework based on microservices. Pivotal is leader of the Spring Cloud open source community and offers Spring Cloud business solutions as well. The cooperation between Chow Sang Sang and Pivotal has room for innovation.

The core of Chow Sang Sang's digital transformation is data-driven decision making. The all-cloud platform and agile development support the omni-channel transformation of Chow Sang Sang's business and use data analysis to achieve more refined operations. For example, Chow Sang Sang introduced the experience from online store to physical channels, and conducted AB tests on different products and customer popularity to improve the conversion rate of physical stores.

"Nowadays, to launch a new business, we must have the support of IT systems. Double 11, smart stores, etc., IT is involved in more businesses. All directions, promotions, conversions, etc., need to be implemented quickly." Mr. Poon said, "Chow Sang Sang has changed to an innovation-driven company from a technical level."

香港著名珠寶商周生生，其品牌名稱源自中國經典哲學《易經》的“周而復始，生生不息”。周生生一直以來保持對於珠寶的熱誠，不僅堅守保持傳統的優秀品質，同時也不停注入創新和創意。

## 周生生的數字化轉型，與Pivotal共同走上敏捷開發之路

周生生成立八十多年來，多次創下突破性的成績，包括：成為首家珠寶企業在香港聯合交易所上市（1973年）；首個突破傳統並推出主題系列的珠寶品牌，推出 Hello Kitty 精品系列（1997年）；首個香港珠寶公司建立品牌網站及網上銷售店（2001年）等。

周生生非常重視網絡銷售渠道，積極入駐了天貓、京東等電商平台。2017年，周生生的網上銷售持續增長，已經達到內地銷售的14%。進入2018年，周生生積極展開數字化轉型，與戴爾科技集團的軟件公司 Pivotal 合作，通過採用最新的 Pivotal Kubernetes Services (PKS) 容器化基礎設施，支持以實體店與網店一體化運作等為代表的數字化轉型。

“周生生的數字化轉型，與 Pivotal 開始合作是一個標志。”周生生 CIO 潘揮廉表示，周生生在十年前採用 SAP Hybris 的單機架構開發了自己的網站，最近幾年確定了 IT 轉型的計劃，隨後不斷思考如何落實 IT 轉型。對於業務的轉型來說，IT 資源是核心驅動，因此周生生與 Pivotal、VMware 以及 Dell 合作，建立私有雲平台並與公有雲進行無縫對接，在此基礎上實現 DevOps 自動化，希望從軟件開發到營運都能全面實現自動化，以敏捷 IT 追上業務轉型。



### 數字化轉型的挑戰

消費者越來越精明，很大程度上是因為電商渠道的存在。周生生 CIO 潘揮廉解釋，周生生在 8-10 年前就開始積極入駐天貓、京東、唯品會的渠道，銷售也取得了快速增長，但也對線下渠道帶來了挑戰。由於消費者很容易通過手機獲取不同電商渠道的產品和價格信息，於是就特別喜歡在線上瀏覽產品再到線下實體店看產品、聽營業員解說，然后再回到線上渠道購買產品，這就導致線下實體店的營業員沒有動力招呼這類顧客。

對於周生生線下店面來說，由於擔心到店顧客最終還是回到線上渠道購買，而無法獲得銷售收入，因此導致對於到店顧客的熱誠降低，最終帶來的結果就是同店銷售的下降。為了解決這個問題，周生生計劃展開實體店與網店一體化運作，也就是通過整合實體店銷售過程與追蹤線上銷售結果，計算出一個銷售過程中的線下實體店貢獻率，這樣就可以讓線下實體店也能分享線上銷售成果，這就是周生生提出來的全渠道新理念。

周生生 CIO 潘揮廉表示，實體店與網店一體化運作，對系統、流程等的改變不是線上線下那麼簡單，而是全渠道覆蓋，這就要求公司的 IT 能夠更加敏捷、追上業務變化的速度。此外，電商合作伙伴也都處於快速變化的狀態，例如京東的無界零售也要求實體店的配合，也需要周生生的 IT 變得更加敏捷。而周生生自己的官方網站，還可以實現“月享錢”等積分計劃，是內部 CRM 系統的一部分。因此，購物、網店、CRM 系統等不斷變化的業務與 IT 需求，就需要以微服務架構為代表的新一代技術架構，這就是周生生選擇 PKS 的主要原因，以及通過 PKS+Pivotal BOSH 平台無縫打通私有雲和公有雲，從而銜接自己的業務系統與電商的業務系統，滿足業務快速變化的需求。

### “全渠道”IT 平台

周生生正在建設新一代的實體店與網店一體化運作的全渠道銷售，相應的也需要公司的 IT 成為“全渠道”的平台，從而實現敏捷的 IT 並支持敏捷的業務。而由於之前是單機系統，隨著與互聯網公司的系統對接以及網店和電商等互聯網業務的展開，周生生也需要建立全雲端架構，例如把一個大型的 Oracle 庫分拆成可獨立擴展的分布式數據庫等。

Pivotal 提供了一個現代敏捷開發流程和一個可以部署在每個主要私有雲和公共雲上的雲原生平台。Pivotal 的雲原生平台，支持從開發、測試到生產的雲原生應用全生命周期，除了 Pivotal Cloud Foundry 雲原生 PaaS 平台外，也提供 Greenplum 和 Gemfire 為代表的數據平台解決方案。而在敏捷 IT 架構中，容器是必不可少的技術，也是現代化微服務的重要基礎。Pivotal Cloud Foundry 還提供基於 Kubernetes 的企業級容器化解決方案 PKS，用於運行容器化工作負載。此外，包括 Greenplum 在內的重要服務也可以容器方式運作，以便在 PKS 上運行。



PKS ( Pivotal Container Service ) 是 Pivotal 和 VMware 之間的合作。PKS 基於 Google 開源的 Kubernetes 容器編排技術，是 Kubernetes 的商業運行版本，而 PKS 的最大好處在於向下可以與 VMware 軟件無縫集成，讓企業能夠將 VMware 的統一 SDDC 基礎架構用於容器，而 PKS 本身與 Google Container Engine ( GKE ) 持續兼容並為最新版 Kubernetes 提供支持。

周生生的 IT 合作伙伴香港 Masterson 公司首席戰略官 James Tso 介紹，Kubernetes 本身比較複雜，開源版本還存在著許多問題，PKS 通過提供簡化的安裝體驗和自動化的 Day 2 操作體驗解決了這些問題，提供零停機升級。通過 PKS 集成平台，企業可以實現 DevOps，而無需在開發和運維管理上花費太多時間和精力。PKS 可自動化 Day 2 的操作，尤其是 VMware 和 Google 的合作讓新版本的 Kubernetes 更新，不需要生產系統的停機時間。



PKS 在 Pivotal Cloud Foundry BOSH 之上運行開源 Kubernetes，這是一個基礎架構配置和自動化平台。BOSH 將多個不同的私有雲和公共雲基礎架構的複雜性抽象化，除了 GCP 之外還可與 AWS、阿裡雲等以及基於 Openstack 和 VMware vSphere 的其它公共雲資源和混合雲兼容。BOSH 解決了容器應用程序的雲資源自動化管理，以及生產環境中 Kubernetes 集群的自動化操作和維護。

周生生新一代的 IT 系統是基於 VMware SDDC 的私有雲軟件，以及 Dell EMC 硬件實現的全雲化私有雲，也就是承載 PKS 容器管理平台的 Pivotal Ready Architecture (PRA)，這一整套基於戴爾科技集團的完整雲化解決方案，為周生生提供了“全渠道”的 IT 資源，為周生生下一步數字化轉型打下了良好的基礎。

## 走向敏捷之路

周生生 CIO 潘揮廉介紹，周生生在內地、香港和台灣共有三個 DevOps 團隊，在業務快速變化的前提下，需要對三個團隊進行同時的統籌開發，每個團隊要獨立開發不同的維度，再整合整體起來運維，這對於各方面的要求非常高。一個微服務的質量，就會影響整個 IT 生態。周生生從 2018 年 5 月開始與 Pivotal 合作伙伴 Masterson 及 Pivotal 合作，採用完整的 Pivotal 平台以及 Agile 敏捷方法論，加入自動化的 CI/CD 開發運維自動化，為周生生打下敏捷開發的基礎。

潘揮廉強調，PKS 是一個非常靈活的平台，實施的速度也非常快，預計到 2018 年底就可以完成。此前曾經考慮過其它的方案，但其它平台沒有從容器到軟件到硬件的全面覆蓋，PKS+VMware+Dell EMC 的方案讓周生生可以對一個統一接口，當出現問題的時候就可以快速定位，這是其它開源解決方案組合所做不到的。



除了 PKS 外，周生生目前的敏捷開發主要採用的是 Spring Boot+Spring Cloud 的開發環境，這是基於微服務的開源開發運維框架。而 Pivotal 正是 Spring Cloud 開源社區的主導者，也提供 Spring Cloud 商業解決方案。周生生與 Pivotal 的合作，還有更多的創新空間。

潘揮廉介紹，整個周生生的數字化轉型，核心就是數據驅動的決策。全雲平台和敏捷開發，將支持周生生業務的“全渠道”轉型，用數據分析為企業實現更精細化的經營。例如，周生生在線下店面引入網店的經驗，通過攝像頭進行分析，對不同產品的陳設、店內客戶流行等進行 AB 測試，以提高線下店面的轉化率。

“現在推出一個新業務，必須要有 IT 系統的支持。雙十一、智慧門店等，IT 參與的業務越來越多。引流、推廣、轉化等，都需要快速實現。”周生生 CIO 潘揮廉表示，“周生生已經從技術層面變成了創新驅動的公司。”