10 Thoughts on Digital Industrial in China
– 2017 Innovation China Forum Recap

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"Innovation China 2017 – Digital Industrial" forum, hosted by Shanghai Strategic Emerging Industries Foundation, organized by China Materialia, and sponsored by GE, took place in Shanghai on November 15th. Senior executives from Fortune 500 companies such as GE, BASF, Lenovo, Linde, Shunyu, and representatives from startups and investors, had great discussion on the value of digital industrial, trends and challenges of digital industrial in China. Speakers from Development Research Center of the State Council and Shanghai Municipal Commission of Economy and Information Technology also updated the audience with national and Shanghai policies on digital industrial. Below are my key takeaways from the forum.

1.   Digital industrial is not only a trend, but also essential for industrial development

The keynote speakers shared that even an 1% efficiency increase means hundred billion CNY in China and trillion globally outputs, based on massive amount of gross industrial output value. Decreasing cost in data collection is making digital industrial feasible and ROI is rising. Digital economy was first written into 2017 Report on the Work of the Chinese Government this March.

$6.8T | $700B

Over next 10 years   APM driven

Credit: GE Digital

2.   Digitalization is the global trend - development of distributed, connected, intelligent and automated machines is accelerating

David Mayhew, GE Chief Investment Officer, pointed out that changes in industry are accelerating. The industrial world is changing from centralized to distributed, from purchasing assets (buy equipment) to purchasing services (only rent what is needed and when needed), from static un-intelligent to intelligent & interconnected, from product to service, from manual to automatic. Adapting fast and effectively to these changes is essential for leaders in traditional industries to keep their leading positions.
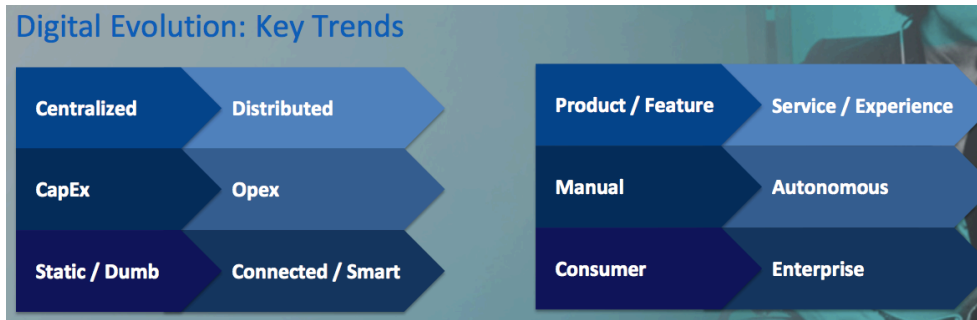
Credit: GE Venture

3. Digital industrial not merely increases manufacturing efficiency, but reforms industrial chain and business model, has far reaching influences

The speakers pointed out that digital industrial not only affected manufacturing, but also has far-reaching influences on business aspects such as equipment usage, maintenance, and sales. For examples, for lots of equipment, 95% equipment time is in idle; recovering the value of 95% idle time will generate new business models. Digital industrial would also have great influences on company internal functions, such as HR, operation, transaction, sales, and customer experiences, which would require re-training of employee, and will be an organization-wide work.

4. Chinese central government policies have changed from supporting single company to cultivating platforms, from supporting single point to foster the development of industrial clusters

The researcher of Development Research Center of the State Council, Wang Xiaoming pointed out that China has introduced a number of policies in support of "Made in China 2025". The policies had changed from focusing on a single project, a single enterprise in the past to cultivating platforms and fostering the development of industrial clusters. Shanghai Municipal Commission of Economy and Information Technology has put forward a goal of "ten, one hundred, one thousand" - to cultivate 10 system integrators, 100 demonstration factories, 1000 high-end manufacturing enterprises restructuring.

5. Large companies will lead in the digital industrial roll-out

The participants agreed that challenges in digital industrial transformation in China include: 1) Lack of foundational technical capability - lean manufacturing is a prerequisite for the digital industrialization. Chinese enterprises need to achieve lean production first; 2) Large amount of investment – only top leaders are able to push through such large investment projects; 3) Difficulties in data collection - data acquisition in old plants needs to overcome barriers in connecting new and old equipment, and collect data from processes in addition to equipment; 4) Value of data application needs to be explored - requiring leading large enterprises to demonstrate the business cases before smaller players in the same industry can

follow. These characteristics mean that digital industrial projects will start in big companies with lean manufacturing, good data quality and strong financials.

6.   Digital industrial requires combination of digital talent (small business) and industrial talent (large business)

Currently, most of digital IT professionals are working for start-ups, small companies, and people who understands the industrials are working for traditional industrial enterprises, i.e. large enterprises. It takes time for the IT-background start-ups to work with industrial companies to develop application verticals, but once developed, it could be rolled out in that industry quickly. The tidal wave of industrial digitization offers start-ups good opportunities to enter previously inaccessible industrial sectors to reshape traditional industries.

7.   Digital industrial blurs the boundaries between B2B and B2C business models

Digitization creates direct communication channels between industrial products and end-customers, which greatly enhances customer experience, and shortens the customer-to-manufacturer feedback time. For example, comparing with consumer goods, the logistics of industrial products greatly falls behind in information transparency and information accessibility. In the near future, the customers of industrial products can also trace the products in real time and order by one click. In Linde Gas, a traditional industrial gas supplier, the monthly orders are rising exponentially after their online shop launched. More business models in the future will be B2P - business to person, whether that person works for a customer business or is an individual consumer.
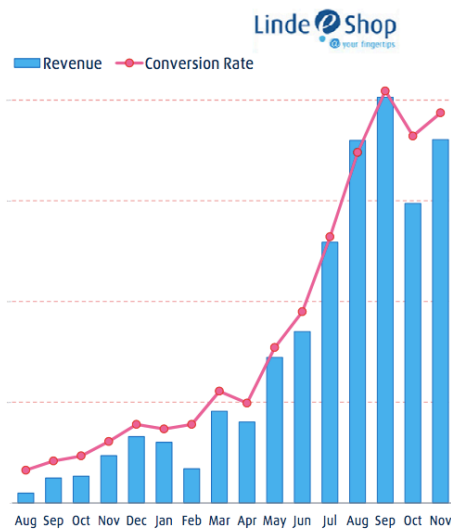
Credit: Linde

**8.   Artificial intelligence will speed up innovation**

Chemical giant BASF is training machines to learn from experimental data accumulated over the years, and then uses algorithms and deep learning to discover new materials and new enzymes, thereby changing the traditional model of repeated experiments and speeding up R&D. US start-ups are using "computational materials science" to develop new materials through machine learning from global literature to predict material performance. And GE Digital Group has acquired four big data and artificial intelligence companies in the past 12 months to incorporate these new technologies into GE Digital Group's products for end user's applications.

Predict catalyst lifetime performance

Intuitive structuring of all data relevant for catalyst research.

Performance ranking after 840 hrs in high throughput setup well correlated with 2700 hrs miniplant test.

Augment enzyme discovery by big data
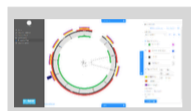
More than 50 million enzyme sequences (internal and external), including patent status and properties can be explored interactively.

Intuitive interface developed with users.

Augment biological entity discovery by literature mining

Artificial Intelligence filtered **29 relevant out of 48,000** published documents.

3 months of manual search had only found **6**.

Continuous literature surveillance **with live relevance filtering** for specific questions.

Accelerate formulation adjustment

First formulation batch adjusted using real customer application data. **Positive performance** in customer plant.

Partnership definitions ongoing now.

Credit: BASF

9.   China has advantages in digital industrial and will generate great companies

China has three major natural advantages in digital industrial space: large industrial production base, rich application scenarios, and easy access to data with relatively loose data regulation. Meanwhile, China's disadvantages are also obvious: shortage of qualified talents and poor data quality. However, in such a big market, it is very possible that a few companies with the right talents and good industrial partners who have data will emerge and grow rapidly.

10.   Corporate Venture Capital will be an innovation engine for digital industrial transformation

David Mayhew, the Chief Investment Officer of GE Ventures, illuminated that big companies are good at growing and operating $ 1 billion & above businesses, while venture capital could help GE nurture companies from zero to $ 100 million. A start-up can and needs to move fast, allocate funds by milestones, while big companies cannot. Digital industrial companies need to have rapid deployment and rapid response to market changes. So far, all of 98 companies invested by

GE Ventures are related to digitization one way or another. In China, GE Ventures has invested in China Materialia Venture Capital Fund II who is actively investing in the space.

Credit: GE Venture