Volume 2

SINGAPORE SEMICONDUCTOR VOICE

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AUTOMATION: A MAJOR GROWTH DRIVER FOR THE INDUSTRY

SILICON CLASSIC 2019 | AUTOMATION SUPPLIER DAY 2019 | ENVISIONING THE FUTURE WITH LED | TAKING STEPS TO BE FUTURE-READY

SSIA
Singapore Semiconductor Industry Association

SSIA EVENTS CALENDAR 2019

MAY

- Automation Supplier Day
- SSLA Module 2
- HR Roundtable 1

JUNE

- Failure Analysis And Reliability Challenges For Advanced Semiconductor Technologies

JULY

- SSIA Members Meet
- Operational Excellence Course

AUGUST

- HR Roundtable 2
- Modern Nanoelectronics: From FinFET to Emerging Future Technologies

SEPTEMBER

- SSIA SUMMIT 2019

OCTOBER

- Industrial Transformation ASIA-PACIFIC

NOVEMBER

- SSIA Annual General Meeting (AGM)

*Please note that the dates and events are subject to changes

For updates, please visit www.ssia.org.sg/upcoming-ssia-events/ or scan QR code:

FOREWORD BY EXECUTIVE DIRECTOR

The past months has been a busy period for SSIA secretariat team. As part of SSIA transformation, we met our first milestone in December last year with the change to our constitution to streamline the structure of our Board members and Secretariat team. We also have a newly elected Board for the next term, making up of industry leaders from various sectors of the semiconductor eco-system. I am confident the new composition will provide diversity to SSIA. The Secretariat team has also expanded to better support operations of SSIA and I am excited to have all the new team members on board to support SSIA and this industry.

2019 is and will be an exciting year for SSIA. There are more activities and initiatives planned for our members and the industry. This is in line with the Industry Transformation Map (ITM) that we are driving on behalf of the semiconductor industry. We have successfully organized events such as Export Control Collaborative Workshop, in partnership with Infineon, as well as our annual Singapore Semiconductor Leadership Accelerator Programme. These activities will definitely help our industry here in Singapore and the region.

The major event in May is our annual Automation Supplier Day. It is an event that helps business matching and development. This year's theme is "Intelligent Manufacturing", with 4 sub-themes under it; Preventive Maintenance, Visual Inspection, Logistics and Automation. In general, this event is about growing the electronics and semiconductor industry in Singapore and focusing on networking and establishing of relationships between end users and suppliers.

We will also be organizing our annual SSIA Summit at the end of Q3 this year. This year's theme will focus on automotive and mobility, a topic which is playing a critical role in the semiconductor industry. We will invite industry leaders as speakers for the event as well as delegates from both MNCs and SMEs. Keep a look out for this event when we announce the event's agenda and launch the registration in coming weeks.

SSIA has also conducted the annual Semiconductor Industry Survey to better understand the needs of members and the industry as a whole. We will use feedbacks to chart the path of the Association in the coming year. One of the key findings is the need to focus on workforce development for the industry. This is a call not just from MNCs, but also SMEs. SSIA will put together a strategy in coming months to address this concern.

Looking forward to everybody's support and participation in our upcoming events. Thank you!

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INDUSTRY

PEOPLE

SINGAPORE SEMICONDUCTOR 50

Singapore Semiconductor 50 marked a successful milestone celebration for the industry. More than 1,000 people comprising of industry pioneers, business partners, leaders and professionals gathered to commemorate this once in a lifetime celebration. It was a proud moment for everyone who has attended as all of them have played a significant role in bringing the industry to today's stature.

The celebration was held at The Ritz Carlton on 14 November 2018. Attending guests had the opportunity to walk through the featured timeline exhibition, which encompassed industrial highlights through the last 50 years. The event was graced by Mr Tharman Shanmugaratnam, then Deputy Prime Minister and Coordinating Minister for Economic and Social Policies, who congratulated the industry for the remarkable achievements in the last 50 years and stated how the success of the industry has propelled Singapore's economy in his speech.

Amidst the backdrop of entertaining music and artful performance, the guest indulged in a sumptuous meal, meeting old friends and forging new connections. It was a night of spectacular celebration well deserved and enjoyed by every guest.

Mr Thaman Shanmugaratnam's arrival at the Ritz Carlton, welcomed by SSIA Executive Director Mr Ang Wee Seng, leaders from the industry and EDB leads

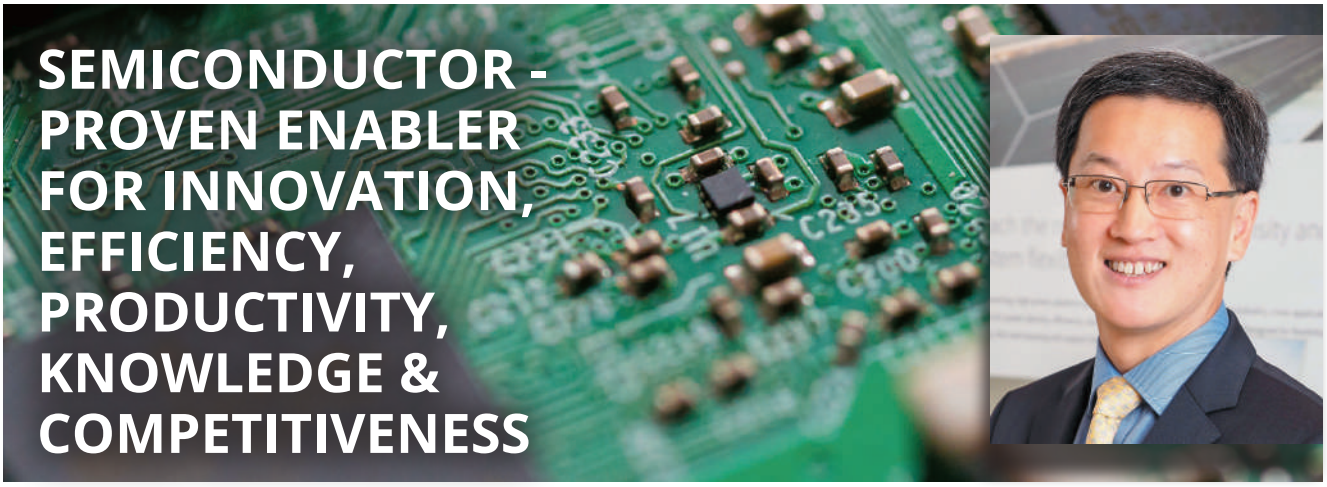
More than 1,000 industry leaders and business partners converged for the night of the semiconductor industry's golden jubilee celebration

It's all cheers and smiles - a night of heartfelt connections amongst business partners and friends for coming so far together

Every guest received a limited edition wafer-embedded medallion as a commemorative gift

Entertaining performance at the dinner

Featured timeline exhibition encompassed industrial highlights through the last 50 years



SEMICONDUCTOR - PROVEN ENABLER FOR INNOVATION, EFFICIENCY, PRODUCTIVITY, KNOWLEDGE & COMPETITIVENESS

INTERVIEW WITH ANDREW CHONG, NEW SSIA CHAIRMAN

Andrew Chong has over 30 years of experience in the fields of strategy, management, people development, marketing and engineering in the semiconductor industry in Asia Pacific.

He is the Advisor to the Board of Infineon Technologies Asia Pacific since stepping down as President and Managing Director in 2017. During his 23 years in Infineon, he successfully steered the business in Asia Pacific from demand fulfilment through demand creation to business creation by developing technical, management and organisational capabilities of the company.

Andrew was elected as the Chairman of SSIA's new Board in December 2018.

Congratulations to you on your newly appointed role as Chairman of SSIA. Please share with us your affinity with the industry and SSIA.

After having enjoyed a thirty-year career in semiconductors, you could say that the industry is in my blood. I have great respect for the intellect, the creativity, the innovation and the effort put into the business by industry players all along the value chain. Semiconductors drive a substantial part of the development of the global economy and enable much of the improvements in our lifestyle.

What's the first and foremost thing you would like to focus on as the Chair of SSIA?

I would have to name the first 2 things to focus on as these go in a pair. One is an Enabler and one the Goal. The Enabler is the capability of SSIA to drive towards the goal. SSIA's capability resides in its full time Secretariat, its partners and also its members. Furthering on the work of past leaders of SSIA we will continue to develop our staff, expand our cooperation with partners and engage our members for mutual benefit. The goal, of course, is to sustain a vibrant semiconductor industry in Singapore. To this end, we need to understand how the ecosystem in Singapore supports itself, identify future needs and create opportunities for our members both to contribute and benefit from the mutual interactions. Defining these goals and validating it with our members will be one of the priorities.

As a President and Managing Director of Infineon Technologies previously, you have successfully created a winning business model in management, organizational capability and technological

advancement. How do you see this valuable experience translated into your new role as the Chair of SSIA board?

I believe that the Board and SSIA's active members have the required experience and know-how to achieve this transformation. As experienced business leaders, we know that we have to understand our business environment, analyse the key industry levers, define the needed capabilities and then have the courage to drive implementation. While the challenge of transforming the industry landscape is a complex one, we are fortunate to have allies in government, institutions and adjacent industries.

You are also currently in the Future Economy Council (FEC) Manufacturing sub-committee. How do you see the contribution of the electronics and semiconductor to the future of Singapore economy and what will be the challenge the industry might face?

The work of the FEC and its sub-committees have given us a strong institutional framework under which we can work. Under this umbrella we have the common aim of cooperation in transformation. Semiconductor within the electronics sector remain an important part of the economy. Besides being a substantial industry in our own right, we are also a proven enabler for innovation, efficiency, productivity, knowledge and competitiveness.

How can SSIA as an industry trade association be at the forefront to manage and move ahead amidst this challenge?

SSIA has to step up to take an active role as the transformation process goes beyond an individual company. While consciously ensuring that we do not dampen the entrepreneurial initiatives of individuals and companies, the trade association will visualize a common view of challenges, highlight opportunities and threats, organize available industry capabilities and offer members assistance as they see fit for their business needs.

“SSIA will visualize a common view of challenges, highlight opportunities and threats, organize available industry capabilities and offer members assistance as they see fit for their business needs.”

We see that the semiconductor eco-system is made up of both MNCs and SMEs. What are you plans for SMEs, and how can SSIA bring better values to SME members?

SSIA's role will be to strengthen the semiconductor ecosystem as made up of all its members. Each sector of the industry will have its role and its benefit from the transformation of the whole ecosystem. Global players will have a stronger local base of partners and local players will have a platform to access broader markets and more competitive practices. We aim to put in place programmes which target different segments of our membership, but to do this within the larger business environment in which our members compete. For example, staff training should not be a social exercise but must be targeted to achieve a business goal e.g. meeting customer reliability needs or improving productivity. While SSIA can offer the network to help improve staff development we can also highlight to our entrepreneurial members the competitive advantages of doing so.

What's your leadership philosophy and how do you think this can spearhead the growth potential of SSIA? You believe in creating sustainable business success through organizational and employee development, what are your plans to develop SSIA and the secretariat team?

One of the aims of the recently approved SSIA Constitution is to strengthen our full-time Secretariat, and to spell out the strategic and governance role of the Board. We will achieve this by defining the skills we need in our team, the achievements that need to be met and the spirit by which we work and cooperate. The role of the Board will be guiding this to make sure that we have a purposeful, orderly and sustainable development of people and processes within SSIA.

What's your personal aspiration and how do you see that aligning with your new role?

I have been fortunate to have had many fulfilling opportunities and self-less guidance throughout my career. Both within my previous responsibilities and for my future roles, it will be my aim to perpetuate this approach of creating sustainable business success and achieving individual aspirations.

SSIA WELCOMES NEW BOARD

A group shot of the new Board of senior leaders from the industry -
(Left to right) Brian Tan, Jerome Tjia, Chen Seok Ching, Andrew Chong, Jennifer Teong, KC Ang, Rajan Rajgopal

Singapore Semiconductor Industry Association (SSIA) welcomes the new board elected during the Annual General Meeting (AGM) on 3rd December 2018.

Andrew Chong, Advisor to the Board of Infineon Technologies Asia Pacific, was elected the new Chairman of SSIA Board. KC Ang, currently the Senior Vice President and General Manager of GLOBALFOUNDRIES Singapore and Europe, is the new Vice Chairman of the Board. Other industry leaders who were elected as office bearers to the SSIA Board include Jerome Tjia as the Honorary Secretary and Brian Tan as Treasurer. Jerome heads the Development Centre of Infineon Technologies, while Brian is the Regional President of Applied Materials. The new board also includes two female industry leaders, Chen Seok Ching, Vice President and General Manager of Marvell Technology and Jennifer Teong, Manufacturing Vice President of Silicon Labs International. Rajan Rajgopal, President and General Manager of DenseLight Semiconductors was also elected into the new Board, representing SMEs.

SSIA looks forward to leverage these senior leaders' expertise in creating and sustaining a highly competitive, leading edge and vibrant semiconductor eco-system here in Singapore and the region.

A NEW PAGE FOR SSIA

INTERVIEW WITH BOARD MEMBERS

Rajan Rajgopal, President and General Manager of DenseLight Semiconductors, has over 25 years of global corporate experience spanning Asia, Europe and US. Having authored over 20 papers and being awarded 4 patents, he brings a wide spectrum of knowledge in the industry with demonstrated leadership in technology, operations and customer/product management.

This is a crucial time for both SSIA and the industry, going through major transformation to drive the industry forward. What excites you about coming on board SSIA at a time like this?

I think SSIA has matured over the years just like the semiconductor industry has done over the last 30 years and is currently at the start of a major transformation. The industry in Singapore is moving to new innovative areas such as biomedical, photonics, IOT and industrial automation for productivity i.e. Industry 4.0. It is exciting for me to be part of this transformation journey as it will lay the groundwork for the near future.

As a senior leader in the semiconductor industry, how do you see your expertise and experience being utilised in your new role?

Being part of the Singapore semiconductor eco-system for the last 23 years, I feel that my experience in large MNCs like GlobalFoundries and Micron and my current role at Denselight, which is an SME, will help me bridge the gap between small and large companies when it comes to issues such as recruitment, resource management and innovation.

The new Board comprises of other senior leaders from the industry with their own expertise and experience. How do you see this enabling the capability of SSIA in terms of reaching its goals?

The goal of SSIA is to be a "common voice" for the semiconductor industry in Singapore. With the varied experience base of the board, we can spearhead different segments of the value chain to ensure the vision and mission of SSIA are enabled.

How important are collaborations for a trade association such as SSIA and how can we build on partnerships to create a cohesive electronics and semiconductor community in Singapore that can thrive?

Collaboration between SSIA members is extremely critical to the success of each of the member companies. By providing a platform for companies to collaborate they can learn from each other in terms of best practices for HR, finance and operations.

What is your personal aspiration for the Association and how do you see that aligning with your new role as officer bearers of SSIA board?

My personal aspiration is to the raise the profile of SMEs in the semiconductor eco-system in Singapore by leveraging the best systems from MNCs and providing key learnings from SMEs to MNCs.

COMPLEX EQUIPMENT CONSORTIUM (CEC)

The Complex Equipment Consortium (CEC) consisted of 17 key industry players such as manufacturing plants, equipment makers, automation modules suppliers, academia and research and development entities. The consortium members hope to deepen technological capabilities in our industry eco system through an open dialogue with the various expertise in this consortium.

Way back in 2014, a group of leaders in the local semiconductor wafer fab community had already started to get together to discuss their challenges in running their mega fabs in a time when there was a shortage of skilled labour and a high labour cost.

This group of wafer fab companies including key semicon automation suppliers were invited by Mr Lee Soon Kiat of GLOBALFOUNDRIES to have open discussions for solutions. Mr Lee, who was also an ex-EXCO member of SSIA, managed to bring the industry people together to work out a direction for improving productivity in the fabs. With the inception of the idea that SSIA should provide an official platform for the semicon industry eco system to come together to focus on equipment technology and innovation to meet future challenges, CEC was launched in December 2018.

Prior to the first CEC meeting, SSIA had prepared a survey to gather feedbacks on various needs from CEC members. A summary of the survey was presented and verified during this meeting.

First point gathered was that both Front-end Wafer Foundry users and Back-end Assembly users, have major interests in Material Handling solutions (mobile robots handling wafers, trays etc) and Test & Inspection (including Metrology) solutions while the details of solutions would have differences due to different natures of front-end and back-end manufacturing operations.

Secondly, both types of manufacturers reflected interests in process and packaging solutions. Though not as top priorities, their interests were mostly specific application case requirements where smaller one-one-party discussions deemed necessary in future.

Another area that was covered in the survey was on the IOT and connectivity aspects of requirements for manufacturing operations. The third point revealed from the survey was the major interest in obtaining Predictive Monitoring and Data Analytics solutions. In the discussion, members shared that as semiconductor manufacturers considered themselves sufficiently connected in and between their global plants and as artificial intelligence was still a new technology, getting Connectivity & IOT and artificial intelligence solutions was not the priority now but maybe in the near future. During discussion, members also shared on Data Analytics solutions. Their experience was that it was not easy to out-source this task to a solution provider as there was deep domain knowledge in-house that was best dealt with by the in-house team of data scientists and managers. There was also a huge concern on data and information security amidst the competitive world out there.

All the findings from the survey were verified with CEC members who attended the meeting and majority were related to productivity and quality improvements. However, another important aspect that was brought up apart from productivity was the need for a good Automated Security cum Warning System Solutions for the factory grounds and assets.

In view of wide spread requirements for technology solutions, it was suggested that in future meetings, CEC members host presentations on relevant solutions to share their expertise and explore potential innovations. Moving forward, it was suggested CEC should have sub-groups set up for various requested technology solutions. These sub-groups will further explore solutions to prioritised R&D actions in their own brainstorming sessions and discussions. SSIA welcomes more relevant organisations to join the CEC to contribute to solving overall industry challenges together.

Overall, the whole CEC team was very transparent in sharing their challenges and tested out solutions with their counterparts. SSIA extended its gratitude to several members who were forth-coming in offering their premises to support future meetings.

With such cohesive teamwork and positive spirit, it is evident that the CEC team will continue to inspire and help each other grow and build a vibrant semiconductor eco-system in Singapore and thrive in the years to come.

ABOUT THE AUTHOR

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CEC Member Companies

• AEM • CEI • Evercomm Tech • GLOBALFOUNDARIES • Sesto Robotics • Kinergy Corporation • Lumileds • Plasma Innovation Labs • Semi Integration • Siltronics • SIMTech, A*Star • Singapore Polytechnic • Singapore University of Technology and Design • STMicroelectronics • SSMC • Schneeberger Linear Technology • MEDs Technologies •
(Total 17 organisations)

SILICON CLASSIC 2019

This year SSIA organised the 7th Annual Silicon Classic, Charity Golf Tournament, which was held at the Singapore Keppel Club on 12 April 2019. This yearly event is a generous initiative by Chia Soon Hwee, KC Ang and Russell Tham bringing together friends of the industry for a good cause. This event successfully collected a record high of $115, 000 and all charity proceedings will be donated to the North East CDC funds, namely North East School Meal Fund, North East Tuition Subsidy, Heart Bakers, Project Refresh, Community Employment Programme as well as the North East Growth Fund - Milk Diaper Scheme.

The first flight tee-off started at 1pm amidst the blazing sun. The heat could not keep the golf lovers away, as the game progressed swiftly. The afternoon of fun continued into the evening as participants refreshed themselves to join in the dinner.

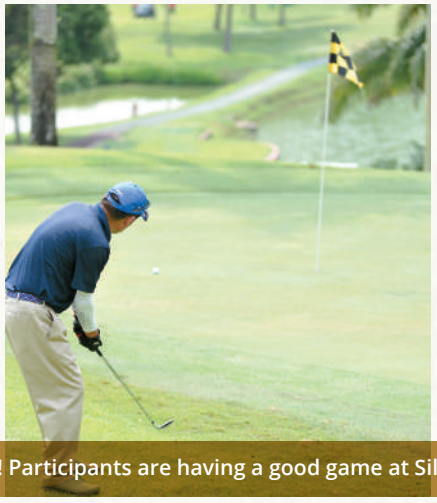
Dinner commenced with special entertainment and lucky draw activities. While participants were enjoying the food and mingling, they also actively participated in the auction session.

SSIA is grateful to all participants for their participation and contribution and looks forward to the continuous support in upcoming charity events.

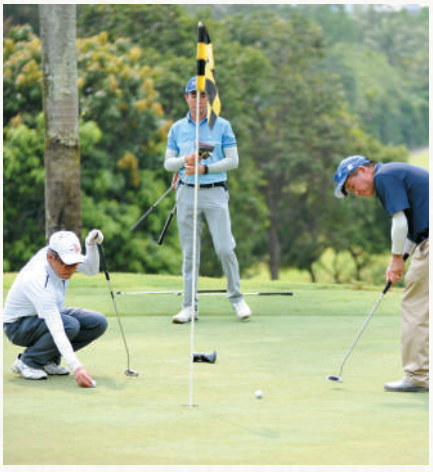
(From left to right) Mr Russell Tham, Mr KC Ang, Mr Shamsul Kamar and Mr Chia Song Hwee

Congratulations to the Silicon Classic 2019 winners

A time to catch up old friends and making new ones



Just tap it in! Participants are having a good game at Silicon Classic 2019



EXPORT CONTROL COLLABORATIVE WORKSHOP

Achieving Compliance & Fostering Collaboration

Singapore Semiconductor Industry Association (SSIA), in partnership with Infineon Technologies, organized the Export Control Collaborative Workshop at Grand Copthorne Waterfront Hotel on 18 April 2019. Export control is an important topic for the semiconductor industry and it is essential for industry peers to know the latest trends and developments in Export Control, the key challenges that they are facing, and best practices they can reference to. The workshop has brought all these topics together, with over 70 participants from over 40 companies participating.

According to the survey conducted after the event, close to 98% of participants found contents of the workshop beneficial and fulfilling their expectations, while almost 99% of participants were keen to attend the workshop again. The breakout session was a hit with 64% of participants strongly agreeing to keep it in the next workshop. SSIA has set up a workgroup on Facebook for industry peers to exchange ideas and insights on topics of Export Control and Trade Compliance.

Visit the link or scan QR code to join:

https://www.facebook.com/groups/371138803612364/

Workshop Highlights

Latest trends in US Export Control Regimes
by *Scott Anderson*, Regional Export Control Officer, Bureau of Industry, Embassy of the United States Singapore

Complying to Singapore Export Control Regime
by *Irene Ho*, Assistant Head, Company Compliance Branch, Singapore Customs

Export Controls in the Netherlands and current developments in the EU
by *Rick Ligthart*, Customs Attaché, Embassy of the Kingdom of the Netherlands

Developments in Philippines and Thailand Export Control Laws
by *George Tan*, President, CAPTCIS

Global Export Licensing Guide
by *Lino Arboleda*, Senior Manager, International Trade Compliance, General Electric

APAC International Trade Mega Trends and their impact on trade compliance
by *Angelia Chew*, Founder & Managing Partner, AC Trade Advisory Pte Ltd & *Eugene Jang*, Co-Founder & Partner

Breakout session:Challenges ahead for Export Controls regimes in the AP Region
Moderated by *Lino Arboleda*, General Electric & *Humairah Ibriam*, Export Control Manager, Infineon Technologies Asia Pacific Pte Ltd

(Left) Mr Scott Anderson receiving the Certificate of Appreciation from Mr Ang Wee Seng

Ms Angelia Chew

Group photo of speakers and participants

(Left) Ms Irene Ho receiving the Certificate of Appreciation from Mr Ang Wee Seng

Close to 98% of participants found contents of the workshop beneficial to them and their companies

Mr Lino Arboleda

Mr George Tan

Participants sharing their experience and problems during the breakout seesion

Mr Rick Ligthart

AUTOMATION: A MAJOR GROWTH DRIVER FOR THE SEMICONDUCTOR INDUSTRY

Wide-ranging applications of artificial intelligence are emerging rapidly in semiconductor manufacturing. This could be in the form of machine learning with big data analytics or supported by infrastructure such as IoT capabilities.

We call these interactions “Intelligent Manufacturing”. With the help of new production models powered by AI systems, semiconductor manufacturers will have new definitions on efficiency benchmarks.


CONTROL PANEL
ON
OFF

AUTOMATION SUPPLIER DAY 2019

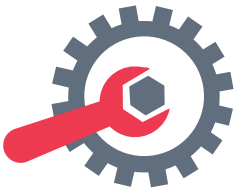
Singapore Semiconductor Industry Association (SSIA) held the Automation Supplier Day at One Farrer Hotel on 23 May 2019. The event has given participants opportunities to gain insights into the best practices of advanced end users of automation solutions in the electronics and semiconductor industry. Local and foreign suppliers of automation products and services were invited to showcase how to leverage IoT, big data analytics and machine learning to intelligently improve manufacturing performance and speed (productivity improvement).

The event was divided into 4 sessions with themes of **Preventive Maintenance**, **Visual Inspection**, **Logistics** and **Automation** in the breakout sessions.

It has also served as a platform of networking and business matching where participants could engage potential customers or suppliers through the digital platform in the event apps. SSIA hopes that this event will not only help companies address business needs but also help boosting the semiconductor eco-system in Singapore and the region.

Highlights of Automation Supplier Day 2018

DISCUSSION TOPICS IN BREAKOUT SESSIONS



Preventive Maintenance

One of the highest costs of operation is maintenance of factories' equipment.

A right balance between optimum preventive maintenance activities and equipment down time incurred need to be achieved to optimize operations and cost. By utilizing the advancement in areas such as big data analytics, needs for preventive maintenance can be more accurately predicted. At the same time, preventive maintenance can be carried out in more cost-effective ways with the use of artificial intelligence, achieving a double win for operations indexes.

Target suppliers: Parts repair, parts clean, PM services, machine shop, 3D printing, parts replication, AI on PM scheduling (software)

Visual Inspection

While the industry starts to move into advance manufacturing and production of automotive parts, the need to ensure quality in every part which is created in the factory becomes greater. These needs are driving the demand for better quality control which includes inspecting products at greater volume and higher frequency. As such, we will need a cheaper, faster and better visual inspection solution, which will integrate with the advancement in artificial intelligence and big data analytics.

Target suppliers: Macro inspection supplier (equipment maker), optics supplier, programming (AI)

Logistics

The complexity of logistics management increases exponentially as business go global and it often becomes a challenge for many businesses nowadays. To help improving this area of business, we start to see greater emphasis on utilizing artificial intelligence in enabling complex tracking and reporting in logistics management.

Target suppliers: Programming (logistics apps), big data analytics, warehouse solutions, automated warehouse solution, storage solution, automating storage solution

Automation

As we push for Industry 4.0 across the nation, there is a greater need to automate the factory line to improve productivity such as automating wafer handling. However, it is essential to balance the need for automation to improve productivity versus return of investment (ROI). Companies need to prioritize the investment thus cheaper and better automation solutions to help improving ROI become significantly important. Various agencies are available in the market to help SME automate while the help from local suppliers can further reduce the cost burden of these ROIs.

Target suppliers: Robotics supplier, robotics repair, sensors supplier, programming (AI), big data analytics

INDUSTRIAL TRANSFORMATION ASIA-PACIFIC 2019

NEW LEARNING DEVELOPMENT AND ADOPTION OF INDUSTRY 4.0

Industrial Transformation in ASIA-PACIFIC

Technological advancements such as big data, robotics, artificial intelligence, additive manufacturing, etc., are redefining manufacturing processes, design and production facilities, distribution systems and global supply chains. Manufacturers and businesses, from multinational corporations (MNC) to small and medium enterprises (SME) in Asia-Pacific recognise that current business models are no longer sustainable; they must change and adapt; there is an emerging readiness, but the pace of transformation is uneven.

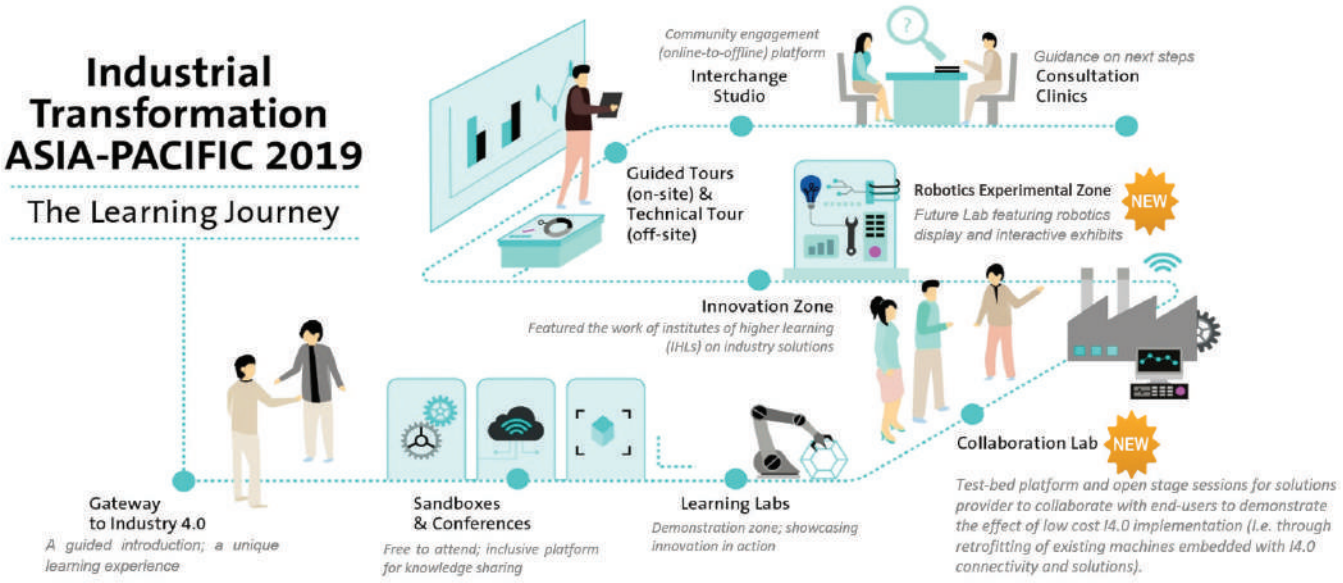
Industrial Transformation ASIA-PACIFIC is a strategic platform that evolves with the industry and is shaped by the leaders and experts in support of their transformative initiatives; a journey that is necessary and made possible by the process of digitalisation, by Industry 4.0. The event serves industry sectors such as aerospace, automotive, biomedical sciences, chemicals, consumer goods manufacturing, electronics, marine and offshore, oil and gas, and precision engineering amongst others. Industrial Transformation ASIA-PACIFIC brings together the eco-system of players and stakeholders across the value chain to learn, share, collaborate, network and do business with each other.

A Curated Unique "Learning Journey"

The customised and curated unique "Learning Journey" in the event is aimed to help companies START, SCALE and SUSTAIN their adoption of Industry 4.0 processes and solutions. Industry-specific presentations will be delivered in more casual "Sandbox sessions" to spur discussion. Guided Tours (on-site) & Technical Tours (off-site) to advanced manufacturing facilities and innovation centres in Singapore will be hosted, too.

The Learning Journey in Industrial Transformation ASIA-PACIFIC

Economies in the Asia-Pacific region are at different stages of industrial transformation, some not yet fully appreciating the advantages of Industry 4.0. For this reason, Industrial Transformation ASIA-PACIFIC features a unique "Learning Journey" on the exhibition hall that guides participants through the process systematically.



Collaborative Lab

Co-lab is a co-creation and demonstration area for solution providers and manufacturers to discuss test-bedding and retrofitting solutions for a stepped approach towards progressive adoption of Industry 4.0. Industry 4.0 Need NOT Call for Massive Asset or Infrastructure Investments. Not necessarily a "$5m" investment but can be a "$50K" solution.

Robotics Experiential Zone

Future Lab featuring robotics display and interactive exhibits to showcase the importance of robotics in the advanced manufacturing and service sectors. This zone consist of workshops and open stages targeted at SMEs and start-ups, robotics competitions/championships and open stages for start-up pitches.

Event Information:
Industrial Transformation ASIA-PACIFIC
22 - 24 October 2019 • Singapore EXPO

COLLABORATION IS KEY TO THRIVE ALONG THE INDUSTRY 4.0 MEGA TREND FOR MANUFACTURING

In the drive towards higher manufacturing productivity, we are witnessing more companies developing and executing their digitization plans. Each sensor data, module condition or machine performance is being collected and sent to the cloud, where data engineers and scientists are waiting. Driving business insights from those data is no longer a dream now, but an imperative corporate goal to ensure survival and growth.

Digitization is not possible without the existence of the underlying IoT technology. Without common and open standards, it would be very expensive for individual companies to develop and deploy their own standards, thereby slowing down the whole digitization process. MQTT seems to gain a very wide acceptance as the communication technology of choice here. It is quickly becoming the de facto standard to communicate with the cloud. While OPC UA is becoming the protocol of choice for device and machine intercommunication on the factory floor, EtherCAT is the dominating enabler of fast and precise control on the machine level.

Such digitalization moves remain, however, rather exclusive in the domains of MNCs. It is not yet common among the SMEs. In fact, many do question what digitalization is and what it means to them. Meanwhile, governments are keeping abreast as we are seeing very strong governmental push to move the local SMEs along the Industry 4.0 mega trend.

Singapore is blessed with a forward looking government who has launched the initiative as early as in 2014. Governments in the ASEAN region are quickly catching up.

Challenges Faced

The biggest challenges for digitization are funding, technology standards and talents.

Funding: This is probably the biggest challenge facing SMEs. Digitization is relatively a new concept in manufacturing space and few companies can claim they have done it successfully. In the absence of successful case studies, it is quite difficult to get the appropriate funding thus many has adopted a wait-and-see attitude.

Technological standards: While some standards in certain areas are quite established, they are not just THE standards. For example, when we look into the area of fieldbus, there's a plethora of options out there: old vs new standards, serial based vs Ethernet based, and a variety of ways that these standards work in. This presents a challenge for the implementer of digitization to get the data from different machines or different parts of the plants. The worst case happens when the individual machines run on proprietary technologies and designs.

Talents: The digitization journey is not a 1-month journey. There is no single off-the-shelf component or plug-and-play software solution to perform digitization. For many companies, digitization is a multi-year and multi-stage efforts. Getting the right people to perform different functions along this journey is a challenge. At the same time, this is equally challenging as companies fight over the limited talent pool in the market.

Address The Context Of Talents By Looking Into Different Aspects

Machine design and control – How do we design a flexible system that grows and adapts with different production needs? How can we meet the demand of Lot size-1 production?

Process design – How can we have a flexible factory floor layout with fast switchover? How do we maximize the utilization of limited real estate?

Operational excellence – How do we maximize the availability and productivity of the machine? How do we minimize the cost of using machines?

Green efforts – How do we minimize the carbon footprint of the entire production process? How can we identify energy guzzlers?

Business insights – How to collect, analyze and present business intelligence for decision making at the corporate level?

Re-training And Upskilling The Workforce Is Essential

PLC is synonymous with Industry 3.0, and it simply cannot keep up with the demand of "big data" collection and integration to the IT world. Likewise, another school of practitioners who insist of a C-based PC platform faces the limitation of real-time control, source code coordination and getting themselves stuck in a situation where they cannot move forward because their source code was developed by "someone" who have already left the company.

We need automation engineers to be retrained in IEC61131-3 programming, IEC61158 fieldbus connectivity and IEC62541 OPC UA for a start. Eventually we need them to know PLC control, motion control, safety systems, SQL databases, robotics, network connectivity and cybersecurity.

We need integration between automation and IT, so we can easily bring the data collected on the machine-level to the "big data server" where ML or AI engines can further churn out sound business insights.

We are however facing shortages in data engineers, data scientists, data analysts across the region. This doesn't help with many app-based start-ups getting angel fundings and hiring these engineers in dozens and hundreds.

Working Together

It will take tremendous and concerted efforts from different stakeholders and members of the eco-system to overcome those challenges.

Companies should collaborate more to create common standard since there are more to gain from standardization than competition. Germany is leading this effort and they have done quite well. VDMA is leading the machine standardization for Germany, but such initiatives are relatively lacking in the Asian region.

Governments across the region should help in the funding of digitization initiatives because this is very important for SMEs. While big players have easy access to funding, small SMEs are facing a big challenge here. As such, governments should come in and fill the funding gap in the short to medium term.

Things To Watch Out For

A PC-based platform supports real-time PLC coding and utilizes the powerful hardware platform of a PC. This is much alike the "smartphone" replacement of the old-school PLC. Similar to how "App Store" or "Google Play" marks a delink between the hardware and software, a PC-based platform also has such flexibility depending on the "apps" you run on it rather than those inherent functionalities built into the hardware.

A pioneer in this area is Beckhoff Automation, whose sales has just crossed into the magical USD 1 Billion mark and is now known among century-old veterans like Siemens to be the top players in Factory Automation.

EtherCAT has long been adopted by SEMI as the machine standard, but with the recent developments of EtherCAT P, EtherCAT G, EtherCAT G10 and EtherCAT TSN, much is left to be seen on how far one can continue to go.

5G network is slated to be rolled out in many countries soon. With the promise of high data rate, low latency and lower cost, we should keep our eyes open if actual control loops can be closed over 5G networks. This will bring us one step nearer to science fiction where a central "brain" may control remotely its avatar.

Having the right talents and right mindset will help to set a company apart during this journey of Industry 4.0. We need talents who know IT as well as OT. We need management to recognize and embrace changes at the same time we need middle management to roll out the digitalization strategies. We need governments to provide right incentives to get SMEs moving in the right direction. Simply put, everyone has a role to play.

ABOUT THE AUTHOR

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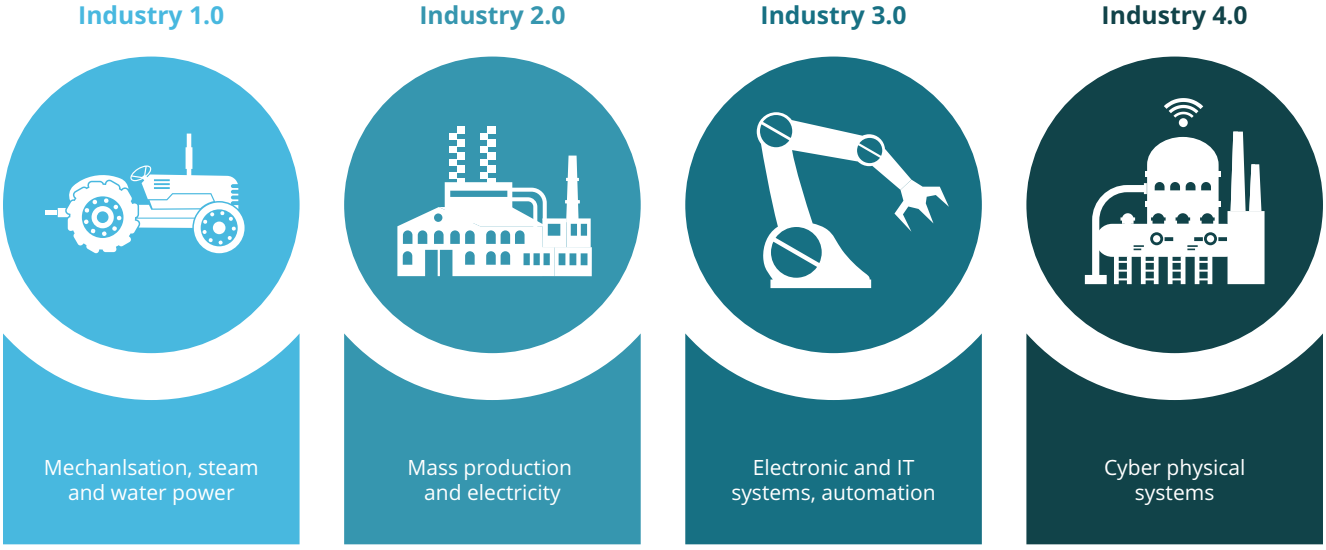
EMBRACING AND KEEPING UP WITH INDUSTRY 4.0

Many of us may have grown up without smart gadgets and pervasive computing, but it's hard to imagine a world without such technologies today.

As recently as in the 1990s, phone calls had to be made at home, or via public payphones, before mobile phones came along. These got replaced by smartphones – which have further evolved into smart inter-connected devices that does more than just connect people.

Essentially, technological advances have brought not only new conveniences, but new opportunities too.

As the term Industry 4.0 implies, there have been major waves of technological innovations before – each wave of innovation was disruptive and transformational. Over time, the new ways became the norm.



Credit: NUS SCALE

The Netflix Transformation

Netflix, arguably the world's largest paid online television network, has shown how embracing disruptions to existing business models and technology can lead to success.

The company started out in 1997 as an online DVD rental business with a flat-fee model that offered unlimited rentals without additional charges. With the Industry 3.0 revolution that ushered in the computers, this use of e-commerce disrupted how traditional video rental chains went about their businesses.

Despite its successes at the time, Netflix chose to further disrupt its business model in DVD rentals by embracing video streaming. This digitalisation of content allowed it to grow its subscription numbers rapidly, both in the US and in other global markets.

As user data poured in, Netflix's algorithm – based on data analysis and combined with detailed tagging of content – enabled it to predict a user's viewing habits and make intelligent recommendations on content that the user may also like, which helped increase Netflix's appeal to a generation that clamoured for on-demand video content.

Industry 4.0 More Than Just Avent of Digital Technologies

Whilst digital technologies are a large part of Industry 4.0, the revolution also comprises hardware innovations such as robotics, autonomous systems and IoT (Internet of Things), many of which are linked to the Internet and provide real-time updates of the machine and surroundings.

There is also synergy between hardware and software now, which will enable changes in business and lifestyle. For example, a television set used to be a consumer product that solely relayed broadcast streams. Now, it is a smart device in its own right, with the ability to tap on an Internet connection to surf the web, or be controlled remotely from anywhere through a mobile app.

While some fear that artificial intelligence will eventually lead to a severe loss of jobs, machine-generated insights alone will not do that. Paradoxically, these insights would still require a human assessment – or 'sanity check' – based on relevant skillsets and deep experience in the business.

Taking A Multi-disciplinary And Cross-functional Approach

In light of the ongoing industrial revolution, the growing breadth of technological change and the organisational transformation required to support this, the National University of Singapore (NUS) is launching its new Master of Science (MSc) in Industry 4.0 Degree Programme in August 2019.

The NUS MSc in Industry 4.0 is a multi-disciplinary graduate degree programme to help employees keep pace with the changing nature of industries amid technological disruptions, and lead transformation to enhance productivity in the workplace.

Learning takes place both inside the classroom and out in the industry, tapping on the deep expertise of four NUS academic units in areas pertinent to Industry 4.0.

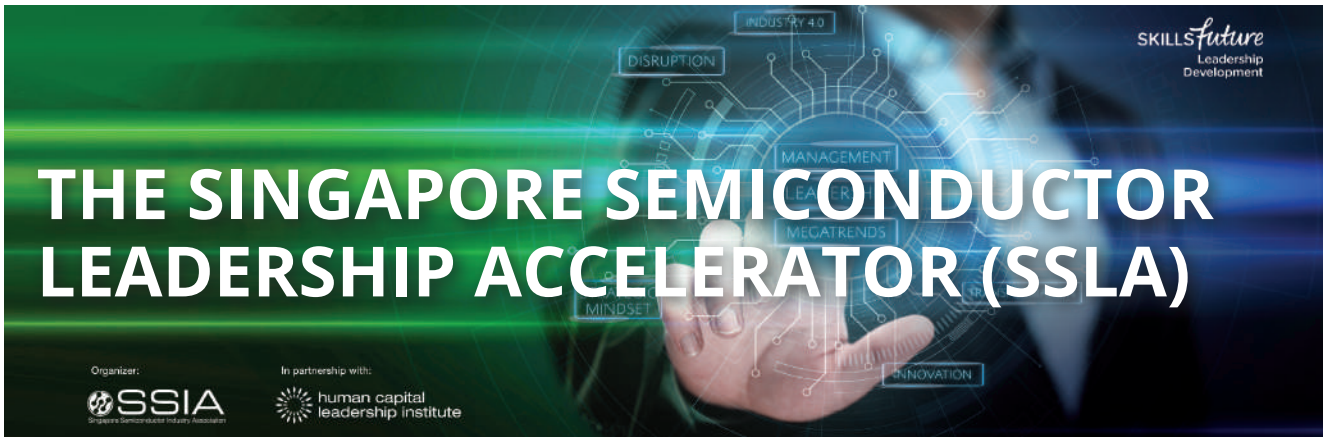
The curriculum is also specifically designed in accordance with the Singapore Economic Development Board's (EDB) Singapore Smart Industry Readiness Index to further aid companies in transforming their capabilities through their human capital, and support Singapore's drive towards becoming a Smart Nation.

Just like its predecessors, Industry 4.0 would continue to transform industries, businesses, and individuals for years to come. And as we continue to bear witness to the growing effects of the Internet and platform businesses even today, businesses should not be afraid of what comes after, and instead prepare themselves for what is to come.

For more information on the MSc in Industry 4.0 and other programmes and courses to keep yourself competitive in the digital age, visit NUS SCALE website at: scale.nus.edu.sg

ABOUT THE AUTHOR

GOH PUAY GUAN
Associate Professor at NUS SCALE/ Academic Director, NUS MSc in Industry 4.0



THE SINGAPORE SEMICONDUCTOR LEADERSHIP ACCELERATOR (SSLA)

The Singapore Semiconductor Leadership Accelerator programme (SSLA) has successfully completed 3 runs with close to 60 participants graduating from this programme. SSLA continues to gain popularity amongst SSIA member companies with its unique course structure designed to deliver immense value in terms of thought leadership training, interactive workshops as well as cross company teamwork events. It also provides a superb resource for networking of future business leaders. SSLA is specifically designed to inspire emerging technical and business leaders to continue creating revolutionary possibilities with semiconductors.

Delivered as two modules, the programme is an immersive hands-on learning experience designed to accelerate personal and professional growth for leaders to succeed in the increasingly volatile, uncertain, complex and ambiguous (VUCA) global environment; with special emphasis and strong focus on the semiconductor industry. SSLA is targeted at senior-level managers and directors who are part of the company's succession plan with responsibility for strategic decision-making. This programme is offered by Singapore Semiconductor Industry Association in collaboration with Human Capital Leadership Institute.

Graduates from SSLA run 3

UPDATED MODULES

To adapt to the constant changes in technology and learning landscape, the SSLA programme frequently goes through evaluation and modification to ensure participants are given the optimum learning experience that is most relevant today.

In run 3, new modules have included Leadership Agility, Auction Learning Workshop, Working Across Cultures, Executive Presence & Influence, Fireside Chat with Business Leaders, Strategic Mind-set, Business Simulation and Engaging with Impact.

SSIA and HCLI are committed to creating a dynamic syllabus that can provide the participants an all rounded learning experience. This carefully designed programme covers the challenges facing the adoption of latest technology, cross-cultural learning, empowered thinking strategies for business excellence and impactful engagement for human capital management. Participants are always given the exposure to interact with leading business achievers who share their insightful experience.

TESTIMONIALS FROM PAST ATTENDEES

The programme was excellent! Exceeded my expectations

– Chin Jiann Min, Advanced Micro Devices (Singapore)

Great selection of speakers and topics

– Howard Chua, MICRON Semiconductor Asia

The introduction of how culture would shape the direction and drive the company was very beneficial. It is useful to know that different cultures would make or break a company

– Collin Tan, Systems on Silicon Manufacturing Co. Pte. Ltd

MEET OUR SPEAKERS

BILL CORNWELL

MANAGING DIRECTOR, CASCADE CONSULTING

Session synopsis:

"Action Learning is a process that involves a small group working on real problems, taking action, and learning as individuals, as a team, and as an organization. It helps organizations develop creative, flexible and successful strategies to pressing problems. Participants will form groups, bring in workplace "problems/issues" that they have, with the facilitator guiding them through the process of insightful questioning and reflective listening throughout module 1 with time to practice. Between module 1 and 2, participants will take action on the problem identified. In Module 2, participants have a catch-up/wrap-up conversation and brief everyone on the outcome achieved, and their learning journey."

STEPHEN KREMPL

PRESIDENT AND CEO OF KREMPL COMMUNICATIONS INTERNATIONAL (KCI)

Session synopsis:

"In today's competitive world, high performance is no longer what differentiates a successful leader from another. Beyond performance, image and exposure are also strong determinants of the success of a Global-Asia leader. There are small adjustments and changes that, when made, will significantly impact the way leaders connect and communicate, and consequently help them stand out in an organisation. The session helps participants overcome limiting beliefs and effect behaviour change, equipping them with practical skills to lead and influence effectively across organisational borders in a diverse organisation."

TARU JAIN

CEO, FUTURE MARKETER

Session synopsis:

"Taru outlines how digital technologies have disrupted several industries and business models, identification of key strategies to enable digital transformation as well as how to invest in digital innovation and avoid digital risk. Throughout the session, various disruptive technologies would be brought to light through case studies & examples."

NARAYAN PANT

THE RAOUL DE VITRY D'AVAUCOURT CHAIRED PROFESSOR OF LEADERSHIP DEVELOPMENT

Session synopsis:

"Leaders must carry a strategic mind set along with them for at least two reasons: Firms need mechanisms by which to align resource commitments, people commitments and priorities – these are usually aligned to its strategy; Leaders must tell compelling stories to diverse stakeholders about why their firms make the choices they do - the language of strategy helps tell a coherent story."

MODULE ONE (RUN 3)

MEGATRENDS

Macro-Economic Trends, Asian Competitiveness Landscape And Their Implications On The Semiconductor Industry.

LEADERSHIP AGILITY

Understand your own change style indicator, the concept of paradoxical leadership and leadership agility.

DIGITAL DISRUPTION

Identifying key strategies to enable digital transformation, invest in digital innovation and avoid digital risks.

AUCTION LEARNING WORKSHOP

Solving workplace problems/business challenges by taking actions and reflecting upon the results.

WORK ACROSS CULTURES

Addressing challenges posed by functional, cultural and virtual boundaries in today's globalised and connected workplace.

IN-BETWEEN

Participants will form their journey groups and embark on an action learning journey to tackle real problems in the workplace. Each will develop themselves as individuals, as a team, and as an organization.

SSLA Participants By Job Titles:

MODULE TWO (RUN 3)

EXECUTIVE PRESENCE & INFLUENCE

Identify and develop personal communication techniques in projecting confidence, clarity and credibility in front of the public, media and other stakeholders.

FIRESIDE CHAT WITH BUSINESS LEADERS

Candid sharing from business leaders on adapting to changing needs of stakeholders, and their approach towards opportunities and challenges.

STRATEGIC MINDSET

Developing strategic mindset through aligning resource commitment and priorities at various stages in the evolution of organisations.

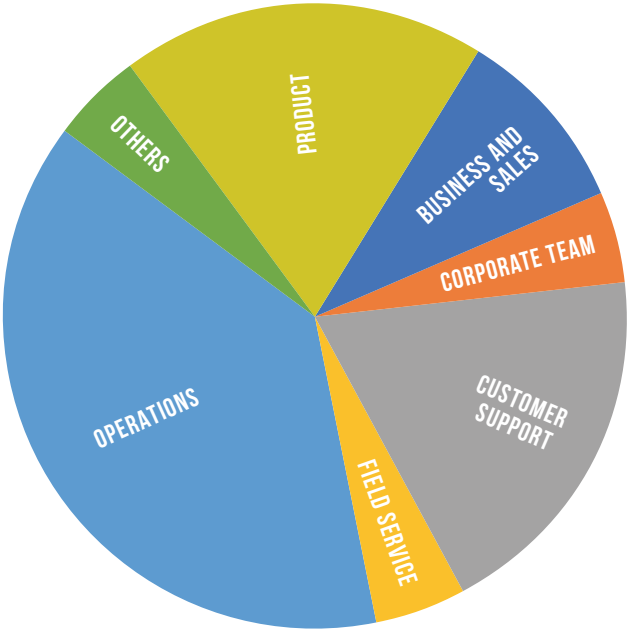
BUSINESS SIMULATION

Applying key leadership competencies to influence team decisions and drive business performance in a rapidly changing business environment.

ENGAGING WITH IMPACT

Overcoming limiting beliefs and driving daily behavioural change with practical skills to lead and influence effectively.

SSLA Participants By Departments:



OPERATIONAL EXCELLENCE

A PROACTIVE PROJECT MANAGEMENT JOURNEY BUT NOT DESTINATION

Striving to achieve operational excellence is one of the most important contributors to an organization's sustainable performance and growth.

It isn't necessarily a destination; rather, it is an ongoing journey that organizations continuously travel. A philosophy and systematic approach at workplace where problem solving, project management, team work and leadership results in the time bounded continuous improvement in an organization to achieve excellence.

In operational excellence, the focus is on business growth. The objective of operational excellence is to get the operation to a place where, "each and every employee can see the flow of value to the customer, and fix that flow before it breaks down." Business growth happens when we have self-healing, autonomous delivery of the product to the customer, without the need for management intervention, day in and day out. Once this is in place, the business can "earn the right" to talk to its current and new customers, find out how their products are used, help customers come up with solutions, look into adjacent markets, and perform other activities that bring in top-line revenue.

Operational excellence is a hybrid of other improvement plans such as Proactive Project Management, Lean Manufacturing and Six Sigma, with a focus on long-term cultural change.

Operational excellence involves getting the right focus from leadership, the right culture on the shop floor, standardized and harmonized business processes across the enterprise, and implementing the needed supporting technologies.

Continuous improvement is important, but it is not enough on its own. As the organization continues to refine its process, product or service, it needs a way to continue to grow. Operational excellence is a mindset that embraces certain principles and tools to create sustainable improvement within an organization. Seeing it, however, isn't enough – they should actively try to improve both the value and its delivery. Ultimately, operational excellence is not just about reducing costs or increasing productivity in the workplace; it is about creating the company culture that will allow you to produce valuable products and services for your customers and achieve long-term sustainable growth.

Operational excellence and lean manufacturing share some similarities in their methodologies, but there

are key differences. Lean focuses on eliminating waste and does this by training people on tools that eliminate waste (5S, setup reduction, value stream mapping, mistake proofing, etc). While lean tools are needed to achieve operational excellence, it is how they are applied that counts. Take value stream flow, for example. In lean, we map flow and look for opportunities to reduce waste and create a future state with less waste. In operational excellence, we actually design a flow using principles and guidelines. Let's understand this by thinking of a pilot flying an aircraft. When pilots are flying, they want to know if everything is normal or if something is abnormal. To determine normal from abnormal, we look into how the plane is designed to fly. The same is true in operational excellence. We design a flow so we can see if the value stream is performing to the design (i.e. normally). Besides, the status of the flow is visible to every employee.

The goal of operational and process excellence do intertwine. Process excellence focuses more heavily on the journey than the destination. Operational excellence is a final state to be attained, whereas process excellence looks more analytically at stages in production or process, including methods such as process mapping, modelling and more. Process excellence requires constant monitoring. As long as a process exists, there are ways to improve it, streamline it, and encourage more beneficial outcomes. It's easy for operational excellence projects to fail when teams believe they have 'reached their destination' with the project, and fall back into old habits. With process excellence, the journey is never over.

Operational Excellence Isn't Easy

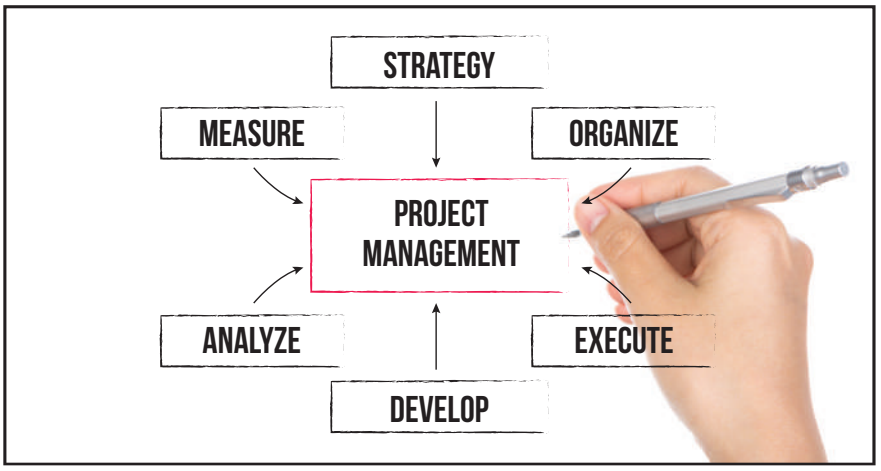
Operation excellence can't be achieved by an accident. It is the result of high intention, sincere efforts, intelligent direction, skilful execution and the vision to see obstacles as opportunities. High intentional improvement requires effective strategic planning and deployment. Strategy deployment is the process of executing your strategy, which is the high-level vision and orchestration necessary to fulfil organization's mission and goals. Deployment is taking the actions required to implement that strategy successfully and repeatedly.

Strategy deployment consists of planning, and execution. To achieve and increase the chance of success, key points are pro-activeness and intelligent directions in various project identifications. Companies should stimulate the generation of ideas for improvement on the shop floor. Many companies, across a range of industries, find the goals of effective execution and project planning to be among their biggest challenges. Organizations that lack identifying problems and key projects alignment with strategic goals often find failures in achieving success.

Project Management

Project management is the key to taking your business to the next level.

Project Management is more than a 'Nice to Have' and is actually a differentiator of high-performing leaders: They consider effective pro-active project management as a fundamental investment for long-term success. It is the application of knowledge, skills, tools, and techniques to project activities to meet requirements.



Good Management

A high performing team needs good management to achieve. Dr. Deming once said excellent leadership drove out fear in an organization and created an environment of trust and respect. Workers would feel free to speak their minds in open dialogues, meanwhile stumble upon ways to improve the workplace. Besides, the greatest challenge to a process improvement initiative is sustaining changes. It is not unusual for improvement efforts to disappear due to a general resistance to change.

What differentiates companies that build a track record of consistent and long-term growth, from the thousands that fail each year? The course on operational excellence organised by SSIA on 4-5 July will give you some more insights.

Course Details:

https://ssia.org.sg/operational-excellence/

ABOUT THE AUTHOR

Sandeep is an accomplished professional with 22 years of progressive experience working with blue chip companies in the electronics and semiconductor industries such as GlobalFoundries and National Semiconductor.

He was the Director for Yield Improvement, Defect Management and Metrology at GlobalFoundries Singapore. He is currently heading a consultancy firm specializing in Operational Excellence, Project Management Overview and Communication Skills. He is also part of the training panel for Impact Volution Consultation in Malaysia.

When he is not trotting the globe training, he is a homebody who likes to do volunteer work in his beautiful hometown in India.

ENVISIONING THE FUTURE WITH LED

Overview

Light emitting diodes (LED), a type of solid-state lighting (SSL) has been commercially available since the 1960s, but in the past two decades there have been remarkable improvements in performance, quality of light and reduction in cost. LED lighting is a transformative lighting technology that has surpassed many conventional lighting technologies in terms of energy efficiency, lifetime, versatility and color quality. Major characteristics of LED lighting include:

Lifespan LEDs have 25x longer lifespan compared to incandescent bulbs.

Energy efficiency LEDs are 75% more energy efficient compared to incandescent bulbs since they do not emit as much heat. Most of the energy consumed by the light source is converted directly to visible light.

Ecologically friendly LEDs do not contain toxic materials and are recyclable, unlike most conventional lighting bulbs contain materials like mercury that are dangerous to the environment.

Color LEDs generate different colors within the entire spectrum of visible light colors without having to use traditional color filters required by traditional lighting solutions.

Size LEDs can have very small footprint (<2mm) and are scalable to a larger size, if needed.

Dynamic Tuning Individual LED can be dimmed, resulting in dynamic control of light, color and distribution, to allow implementation of lighting designs for users' visual, biological and emotional needs.

Low Voltage LEDs run on low voltage power supply, making them easy to use in outdoor settings when connected to an external solar-energy source.

Cost LEDs have a relatively high initial cost however, a low lifetime cost. The technology payback comes primarily with reduced maintenance cost and energy efficiency improvement.

Light Quality LEDs "white" light can be tailored to suit the human eye to optimal eye comfort and facilitate user activities.

With increased cost competitiveness and significant reduced impact to the environment, LEDs are beginning to successfully compete in a variety of colored lighting applications, penetrating into white lighting markets (eg: flashlight, signal lighting) and rapidly replacing legacy incumbent lighting technologies whether it is in private homes, public buildings or commercial premises. LED lighting applications have also evolved beyond the field of illumination, lighting applications into the fields of automotive, mobile, life-science applications (e.g.: horticulture), Internet of Things (IoT), LIFI and emerging applications of UV LEDs and Micro-LEDs.

LEDs in Automotive

Automotive lighting solutions have been focusing on how to achieve the most optimal illumination on the road and surroundings, and yet not blinding other motorists and drivers.

Until recently, Adaptive Front lighting System (AFS) have used mechanical means created by traditional halogen or HID lighting to improve night time visibility across various driving situations, but improvements in LED technology has created a new generation of AFS using compact LEDs arranged in an array. Cameras mounted on the windshield detect and track oncoming vehicles headlight pattern, and the corresponding LEDs on the headlight array are darkened dynamically adjusting to the oncoming vehicle's position as it passes by. The dazzle-free high beam technology allows drivers to keep their high beams on without creating threats to other road users. The precision light control capability of LED based AFS also allows creation of sophisticated effects such as eliminating back-glare caused by wet roads, fog or traffic signs by detecting glare and dim areas.

Smart Lighting

Smart lighting for homes is no longer a thing of the future. Smart appliances, mirrors, showers, and lights are becoming common in households these days. Mobile apps are used to control the smart LED bulbs to perform a variety of tasks, including: turn on/off, choose color and brightness, schedule lights to turn on/off or dim, or even flash when you get a social media notification.

Despite the sluggish adoption of LED in commercial lighting achieving market penetration of just 13% in 2018, the Department of Energy in the United States estimate that LEDs will make up 86% of all lighted products by 2035.

Work environment are designed differently today - more open office concepts, gathering, teaming areas, more collaborative office spaces allowing more opportunities to learn, focus and even socialize. We have ergonomically designed furniture, why not lighting too? With tunable LED lighting systems, we have the flexibility to change color temperatures, provide light for energy boost and calming light when desired. Differentiated lighting now has the capability to increase productivity and creativity.

In order to have smart lighting systems it's more than just having light sources. There is an increasing trend of people combining light sources and sensor networks with advance controls to create lighting systems that can really think.

Light Fidelity (LiFi) vs WiFi

Today we have the Internet of Things or Connectivity in all our devices, there is an exponentially growing demand for Internet. WiFi cannot handle this increase in demand by itself. This is where LiFi or Light Fidelity can make a great contribution to relieve the data traffic in the network to sustain the internet demand.

LiFi is a wireless optical networking technology that uses LEDs for data transmission. By using LiFi in all the lights in and around a building, the technology could enable greater area of coverage compared to a WiFi router.

Both WiFi and LiFi use electromagnetic waves to transfer data, with the difference being that WiFi uses radio waves while the latter uses visible light. Where there is LED light, there will be a connection to the World Wide Web. A bunch of LED lamps are setup in a wireless network in which each lamp is powered with a driver. The driver receives information from a server, encodes it and sends it across to a photo detector.

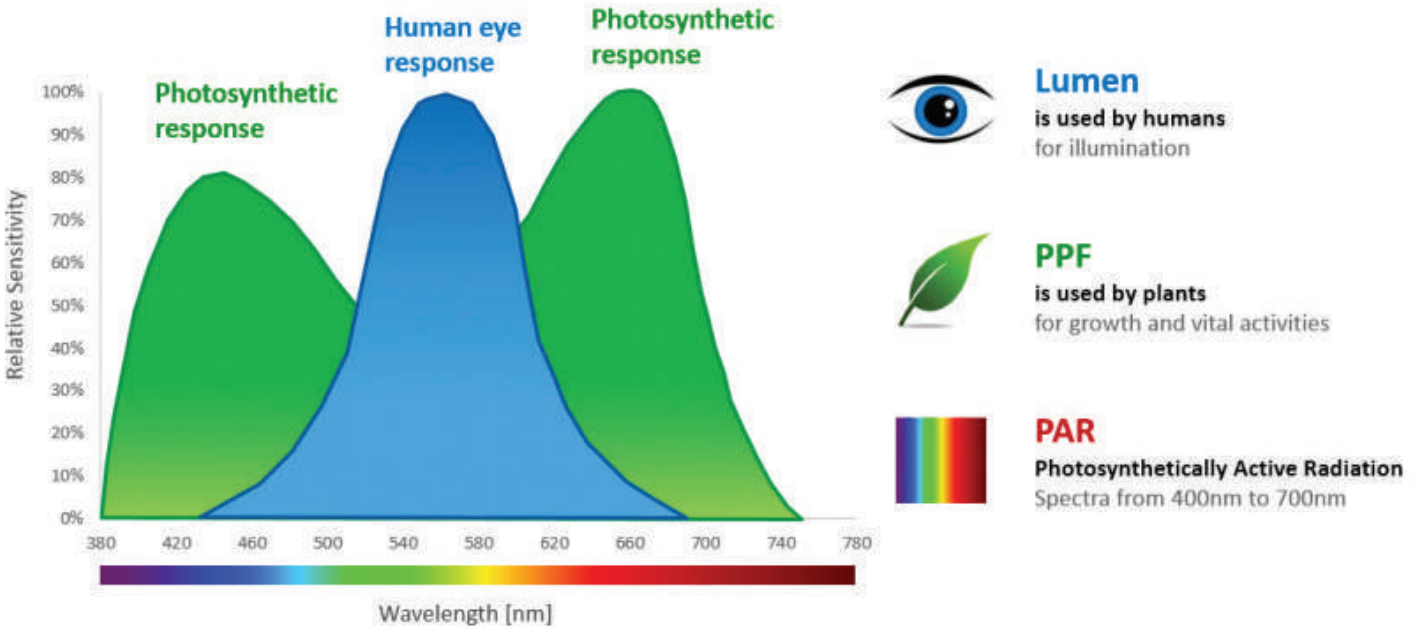
The encoded data flickers at high speed that can only be decoded by photo detector at the other end. This will be over 200 times faster than the current superfast broadband and data transfer with improved security. LiFi data cannot be intercepted without a clear line of sight for additional security. LiFi is more affordable, and data will be much more available compared to what we have today. LiFi is undoubtedly the future of internet.

Although at its infancy stage, and using it for internet on large scale is still in progress, pure LiFi is already providing this technology with dongles and USBs. In a couple of years, light will not just only find a place on our study desks and offices, but also in the form of excellent wireless communication.

LEDs in Horticulture

A Global Harvest Initiative report in 2014 stated that the world population will reach at least 9 billion people in 2050, and we will run out of food if the current rate of production remains unchanged. The Stockbridge Technology Center in UK was tasked to develop a technology that can improve food production sustainability.

There has been a huge amount of interest in LED lighting technology then, as being something that could benefit the horticultural industry. The low temperature of LEDs means that they could be placed near to the plants without damaging them, and since there is no heavy metals or glass in LEDs, there will not be contamination from the lighting system. The LED spectra can be adjusted to control many aspects of plant quality including appearance, height and flowering time. This will help to improve year-round taste and quality, and potentially increase the fruits and vegetables nutritional "Tailor made" light recipes, e.g.: red (600-700nm) spectrum for flowering/blooming and blue spectrum (400-500nm) for vegetative growth,



help the growers to have sustainable crop cultivation reducing vulnerability to threats of climate change, without interruption all year round.

Emerging Applications of UV LEDs

Ultraviolet (UV) disinfection has become an appealing form of technology in global water treatment industry due to increased concerns about chemical disinfection and reduced costs of UV equipment. Compared to the conventional mercury vapor lamp, the UV-C LED offers a number of advantages like low power requirements which make them safer to use. UV-C LED can be made in extremely small sizes, enabling portable disinfection systems compact enough to be fitted inside a residential water-pipe which will render these fixtures virtually self-disinfecting.

Quartz developed and released the 1st "self-cleaning" water bottle in Jan 2018 to harness UV-C LED light to eliminate 99.9999% of bio-contaminants from your water and bottle. This is water purification for the digital age!

The Next Generation Display Technology - OLED vs Micro LED

OLED display has gained wide acceptance in emissive display technology being featured in a range of screen devices from smartphones, Virtual Reality (VR) headsets to televisions in the recent years.

The Micro-LED is basically an LED unit miniaturized and arrayed smaller than 100um with the accuracy that is 10,000 times higher than conventional LED. Each pixel in a Micro-LED is individually addressed and driven to self-emit without backlighting. This emerging technology has the potential to replace LCD and OLED in the future due to its strong potential to be thinner, lighter,

brighter, higher resolution, more accurate color adjustability and lower power display.

The markets for micro-LED displays include:

Automotive heads up display (HUD) with augmented reality (AR)

The"virtual windscreen" displays hazards, driver's speed and navigation screen so that the driver never has to take their eyes off the road, thereby increasing reaction time to external hazards, such as pedestrians. Motorcycle helmet HUDs are also commercially available now.

Near-eye displays (AR/VR), projectors and wearables like smartwatches, as these will benefit mostly from the small size, light-weight, high brightness and high resolution of micro-LED displays.

N-tech researchers say that the Micro-LED market will emerge in 2019 and will grow very quickly over $70 billion in 2027.

The key challenge in micro-LED lies in the industrialization of its production process. Fundamentally there are 2 alternative ways to manufacture Micro-LEDs

a) LEDs are grown on a wafer, developing a backplane substrate with electronic circuitry which moves the tiny LEDs from the wafer to the backplane. Fast and accurate picking and placing millions of units of micro-LEDs is a thought challenge even for full automated tools today; or

b) LEDs are grown directly on the display's backplane, which eradicates the transfer process but limits the size of display as the LEDs are tricky to grow on large substrates.

Many LED companies have been developing various transfer technologies for the mass transfer of micro-LEDs onto the backplane substrate, so it is difficult to judge which of the technologies will become the mainstream in the future.

In the long run, for Micro LED technology to become mainstream, cost reduction, yield improvement and productivity efficiency improvement will be the primary goals.

Conclusion

Integrating sensor technologies within the light engines will be essential to support transformation of the current lighting system into adaptive lighting solutions that will instantaneously react to environmental changes and individual desires.

Besides integrated sensors, compatibility of the drivers, the LED boards/ fixtures, control systems, software and mobile applications must be considered to support lighting applications. Lighting, is no longer just about the light bulb, it is a system with data collection and is providing improved environment for everyone, making the world a better, safer and a more beautiful place to live.

Lumileds: Company Overview

Lumileds is a global company employing more than 9,000 team members operating in over 65 countries. As a global provider of superior-quality,

highly reliable lighting solutions – from automotive, mobile and illumination to security and IoT – Lumileds helps forward thinking designers and manufacturers around the world to gain a competitive edge by bringing truly differentiated solutions to the markets they serve.

Building on more than 100 years of inventions and industry firsts, Lumileds delivers state of the art LED solutions to automotive market segments worldwide. Today, one in every one in two cars in Europe and one in three worldwide is equipped with our front or rear lighting. At the same time, we continue to innovate in the area of LED arrays and Micro LEDs.

Lumileds Flash products empower smartphone device makers to maximize the quality of images for their customers. Lumileds leads the industry with investments in technology and product innovation as well as a vertically integrated manufacturing model. Our commitment to quality, performance and delivery has enabled us to become the market share leader by selling over 3 billion Flash LEDs since we pioneered this application in 2004.

Lumileds has pioneered a comprehensive line up of high performance, application optimized LED solutions for illumination products in the constant quest to help luminaire manufacturers outpace the competition.

In an industry where quality and performance is required today and an innovation road map is essential for tomorrow, Lumileds is a trusted partner to leading automotive, mobile and illumination players around the world to push the boundaries of light.

ABOUT THE AUTHOR

QUEK PUA SAN,
Director of Yield Engineering,
Lumileds

Quek Pua San has 25 years working experience in the Singapore Semiconductors Industry.She has been in Lumileds Singapore for the last 9 years as the Yield Engineering Director, responsible for driving LED yield improvement across manufacturing sites in the vertically integrated LED company. Prior to joining Lumileds, she had held leadership roles in Process Integration, Product Engineering and Yield engineering in REC Group (Cell divison) and Singapore Semiconductor Manufacturing Company (SSMC).When she is not buried under her LEDs, she likes to travel and keep her pet rabbits company.

IMPORTANCE OF SECURITY IN IC DESIGN

Both the trend towards Internet of Things (IOT) and its promise of improved connectivity and mobility, mean added vulnerable devices as entry points to potentially valuable networks. Securing all these devices e.g. mobile phones, smart watches, wrist bands, cars, home appliances, factory robots, etc. may be needed but remains, as of today, a dream. All industries will need to strengthen the security level at the application, system and chip level.

Common security attacks on chips are fault injection and differential power analysis. In this article we will discuss about the two attacks and novel implementation of preventive measures taken during the chip development cycle.

Fault injection attacks alter the proper function of the chip by varying the supply voltage, the clock frequency or other inputs of the design. The hacker exploits the normal behaviour by inserting a single bit or multi-bit fault during computation. Given a design with few registers considered critical to security features, the SYNOPSYS ICC2 Place & Route tool has a feature known as repelling bound. This helps to place certain registers far apart from each other at a user-defined particular distance. This distance makes the situation difficult for the hacker to perform fault injection attack local to each register.

Differential power analysis allows an attacker to compute the intermediate values within cryptographic computations through statistical analysis of data collected from multiple cryptographic operations. The hacker can trace the power consumption profile and identify differences when changing operands. How can this be prevented? Majority of the Integrated circuits use a clock signal to synchronize different parts of the

circuit. The clock in the chip is used by the hacker to get a time reference and a synchronization signal for their attack. In the physical design phase of the chip project cycle, Clock Tree Synthesis (CTS) is a process of inserting buffers or inverters in the clock paths of the design in order to achieve minimum skew and insertion delay. Regular clocking of clocks can be avoided by skipping skew balancing in the CTS phase. As a result of this process, the hacker is unable to determine the peak current of the signal. Even though clock tree balancing is skipped in the design, optimization of setup and hold time is achieved in the subsequent optimization steps namely post clock and post route optimization. ICC2 helps to skip clock tree balancing, and timing convergence is achieved with a feature called Concurrent Clock & Data (CCD) where both clock and data paths are optimized. With this mentioned technique, we can obtain low CTS repeater count, chip cell count, chip area, chip leakage power and clock network power. However, the performance of the chip is not compromised by skipping skew balancing in Clock Tree Synthesis.

This article attempts to give a new approach towards security implementation by placing multiple cells far apart from each other without defining the cell location to the tool. This is also done by skipping clock tree balancing in clock tree synthesis step thereby using an unbalanced skew in the design.

The above two attacks and the counter measures are explained in detail in the Technical Merit award winning paper "A Novel Approach in Security implementation and Clock Tree Synthesis using ICC2" published by ST Microelectronics, Singapore in SNUG (Synopsys User Group), a Technical Conference held in Penang on 24th September 2018.

Link to download the paper: https://www.synopsys.com/news/pubs/snug/2018/penang/t1-01-samuel-paper.pdf or scan QR code

ABOUT THE AUTHOR

ETB. SAMUEL JIGME HARRISON
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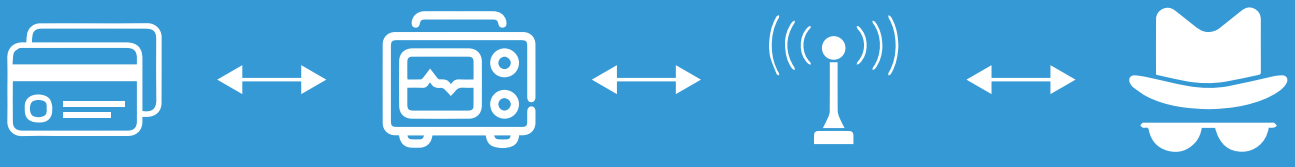


Pictorial representation of differential power analysis

LEADING THE FUTURE

Exclusive interview with Mr Jeff Tang, Chief Technology Officer of HOPE Technik

Can you name a person who has had a tremendous impact on you as a leader? Why and how did this person impact your life?

Thinking about it, I cannot name only one person who has significantly impacted me. In the different stages of my life, whether it be school, Singapore's National Service or in the working world, the collective sum of all the experiences and people I have met have moulded me to become who I am today.

However the one statement which has stuck with me all these years is, "A leader is a servant, you serve the ones you lead." As a leader, I take pride to keep this in mind.

What are the most important decisions you make as a leader of your organization?

As the Chief Technology Officer of HOPE Technik, important decisions are made daily. From engineering challenges, technical directions to short term gains vs long term benefits – it can either make or break a project, product or solution.

This is why we have a set of core values called the '10 Rules of Engagement' which guides the team at HOPE Technik. The fifth rule, "Our best intentions and ideas are put into production and if there are any problems, no blame goes to anyone. We will all fix it," is kept in mind to ensure the best results in teamwork.

Do you believe great leaders need creative thinking skills?

Definitely, there are many qualities which are important for a leader to have, and creativeness should be one of them.

How do you encourage creative thinking within your organization?

By creating a box that is beyond their reach consistently. As they grow and learn, you expand their box accordingly.

What do you value most in your organization, its mission, the core values or vision?

In my opinion, our core values are the most important aspect. Our core values act as a guide on how we treat our clients, teammates and vendors while ensuring that we deliver the best products and solutions.

Firefighting Robot

How do you keep the inspiration alive as your business expands and will there be occasions where you need to compromise on your vision?

Inspiration is an important factor for what we do as engineers, especially during the course of a challenging project as it can be the light at the end of the tunnel. It isn't uncommon for your original vision to evolve as perfect situations, environments or boundary conditions do not exist. I believe that a good engineer or leader is one who knows when and where to strike a balance and this will set you apart from others.

How do you inculcate the vision/ core values in your employees?

I do so by practicing it in every aspect of daily work as much as I can. It takes a team of dedicated individuals to engineer the best products and solutions. In day to day operations at HOPE Technik, the team works hard together. Like a well-oiled machine, we are each other's support system.

How do you ensure these vision/ core values are aligned with your business activities and people you hire?

We take a different approach at HOPE Technik - we strive to ensure that our business activities and the people we hire align with our core values.

What is the most sought after quality or trait that sets one candidate apart from another when you decide on bringing them onto your team?

Grit is what sets one candidate apart from another. Taking that extra challenge and learning new skills on the job should be a given but if you have the passion for engineering, achieving that long-term goal with resilience is something that HOPE Technik looks out for.

Would you like to share any word of inspiration for aspiring leaders in this industry?

A great leader understands that a team as a whole is more important, not the other way around.

Would you be able to share any resources for people who are looking for insights into becoming a great leader?

There are no short cuts or secret recipes here, it is like learning any skill, you acquire knowledge through reading, observing and asking, and of course, through learning from your peers.

Audra Exoskeleton

TAKING STEPS TO BE FUTURE-READY

The electronics semiconductor sector has been a driving force of Singapore's overall manufacturing sector, contributing to more than 25% of the manufacturing output over the past year. However, with trade tensions between China and the US showing no signs of abating, manufacturers are anticipating weaker orders in industry segments such as machinery and systems, in the precision engineering cluster, infocomms and consumer electronics. More sectors may be affected if the US expands the list of products taxed.

According to the Monetary Authority of Singapore (MAS), which forecast 2019 as an uncertain year for Singapore's economy, the negative spillovers of the trade war will very likely impact the Singapore economy this year. Singapore's electronics segment could be hit by the trade conflict as both Singapore and China are key nodes in the global supply chain and about half of China's electronics exports to the US now face higher tariffs. Manufacturing output has already registered its first negative reading since December 2017, with the electronics cluster falling 5.5 per cent. The uncertainty may also result in a slowing down of investments into new product lines.

On a positive note, Singapore stands to gain from some positive spillovers as international firms reconfigure their supply chains in response to tariffs on their businesses, said MAS. It cited a recent survey by AmCham China and AmCham Shanghai which showed that of the 430 American firms polled, around one-third have either moved or are considering moving their production out of China. Southeast Asia was the top destination they wanted to relocate to. As we head into a time of uncertainties and slower growth, it is an opportune time for the industry to transform its business strategies and support its workers in picking up fresh skills.

According to a study done by Boston Consulting Group, smart manufacturing could be a real game changer for Singapore. It could boost labour productivity by about 30 per cent and lead to a net increase of 22,000 jobs over the next 10 years.

Average salaries could also increase by 50 per cent. For this to occur, the industry needs to address one of its biggest challenges, which is the shortage of talent.

As the industry undergoes a smart transformation, talents with complex and cross-functional skills will be in demand. There is an urgent need to address the skills gap in the industry as it embarks on this innovation-driven transformation.

On an organisational level, programmes can be introduced at all levels to encourage talents to retrain to upskill. Companies can consider setting up in-house academies for continuous training and skills upgrading. They can also encourage cross-functional learning through projects to strengthen internal capabilities.

The Skills Framework for Electronics can help employees identify the key skills, competencies and training programmes that they will need to capitalise on new job opportunities and advance in their careers. They can tap on key initiatives such as SkillsFuture Earn and Learn Programme, Enhanced Internship, Singapore Industry Scholarships and Professional Conversion Programmes (PCPs) to support their skills and career journey.

The Adapt and Grow initiative administered by WSG and the Employment and Employability Institute makes wage and training support available for employers and jobseekers. It allows businesses to expand their available talent pool to include mid-career professionals, managers, executives, technicians (PMETs), who can re-skill to enter new job roles and growth areas.

Under Adapt and Grow, initiatives such as the Professional Conversion Programmes (PCPs) integrate job-matching and training to help PMET jobseekers join the industry, and

to reskill those with the necessary competencies to take on new job roles as Engineers or Assistant Engineers.

These two PCPs are six-month training programmes that operate on a Place-and-Train mode to avoid a skills mismatch between companies and newly trained workers. The programmes are designed for different job roles and can be further tailored to individuals' development needs so as to equip them with the relevant skills and competencies for successful career conversions. PMETs are hired and trained through customised facilitated classroom training and structured On-the-Job Training (OJT). During the period of training, employers receive salary support, which lowers the cost of hiring and reskilling mid-career PMETs. Those keen to be trained in skills to support the industry's transformation can look to SkillsFuture, which offers a series of adult training programmes offering more than 400 courses across eight areas, which are Data Analytics, Finance, Tech-Enabled Services, Digital Media, Cybersecurity, Entrepreneurship, Advanced Manufacturing and Urban Solutions. These are eight priority and emerging skills considered most industry-relevant based on data from Industry Transformation Maps and feedback from industry partners.

One avenue of support for companies that want to start investing more in their human capital is the Institute for Human Resource Professionals, set up by the tripartite partners of the Manpower Ministry, the National Trades Union Congress (NTUC) and SNEF. A human resources department driven by progressive and forward-looking people practices can be instrumental in shaping human capital development. Having a proficient HR team trained to hire the right talent and plan their training and development often translates to higher staff retention rate, which ensures alignment with business goals. Organisations can help their human resources team develop business-aligned strategic workforce plans, which will enable their workforce to thrive and achieve organisational goals amid a rapidly changing environment.

TALENT MANAGEMENT: TO TRAIN OR NOT TO TRAIN?

From Fortune 500 multinational corporations (MNCs) to small-to-medium enterprises (SMEs), the biggest question bugging HR practitioners and leaders is the perennial question – how far should we go to attract talents? This question in itself leads to the next question – what should we do with talents that we have now?

Here are some thoughts pertaining to why talent development is important, and consequently why training is also important and also how companies can engage talents through training.

Training as a Talent Development Strategy

According to a survey by Workday, 40% of respondents cited competition for talents as the biggest issue for Singapore's services companies in 2018. Additionally, the World Talent Ranking Report 2018, released last November, found that all in all, talent and education are the major drivers of long-term economic growth for any country.

What does this mean for companies? Simply put, talent has now become a competitive advantage for companies wanting to survive in today's fast-moving global economy.

Attracting talents is just the first step in harnessing human capital for a business. Unlike products and services, a talents pool is dynamic – an organization's ability to engage, develop and subsequently retain talents determines the long-term value that can be harvested from a talent strategy.

One key strategy to talent engagement and thus retention is developing talents through training. Opportunities to be developed through learning and development can form part of an organization's talent strategy – and provide an intangible value to employees that help to retain them, apart from compensation-based strategies.

Prepare Talent for Their Next Role, Not Yours.

'My father had one job in his life, I've had six in mine, my kids will have six at the same time.' Robin Chase, Founder of Zipcar.

Gone are the days in which people expect lifelong employment – today's talents expect to change organizations every few years for a myriad of reasons – such as better career advancement opportunities or even just the exposure to a new organization.

Consequently, organizations that encourage a culture of open career conversations about individual career aspirations, regardless of whether those aspirations align with long-

term positions in the company, result in highly engaged employees. These employees are highly engaged because they are taking ownership of their own long term career development. They are able to contribute strongly in the here and now – because they understand what they are doing on a day-to-day basis moves them towards their own future goals – and there is no greater motivation than this.

Invest In Their Training

'Train people well enough so they can leave, treat them well enough, so they don't want to' said Sir Richard Branson, Founder of Virgin Group.

Organizations that provide opportunities for formal training for their employees naturally increase the level of employee engagement – because investment in training is a clear signal to employees that the company values them and cares enough for them to develop and equip them with skills to move up the value chain.

Provide a Lattice, Not a Ladder

Training efforts need not always focus on 'deep-skilling' a person to develop deeper expertise in a single function or role. Deepening expertise in a narrow function or role can be perceived as career-limiting – restricting access to different career trajectories in future. Given that many employees are 'exploring' options and clarifying their own aspirations along the way, providing them the option to navigate a 'career lattice' may be more attractive than the conventional 'career ladder'.

A 'career lattice' simply means providing lateral advancement and/or training opportunities for employees to develop their skillsets by taking on functions or roles different from what they have started with.

Prepare Them for the Future

In today's climate where jobs are threatened with elimination due to automation, AI and disruptive technologies, the best training that organizations can provide their talents should focus on future-ready skillsets and mindsets. These can include soft skills training – such as interpersonal skills, leadership skills, managing multi-cultural and multi-generational diversity, conflict management and influencing in a complex work, and even focus on learnability and tech-savviness.

In summary, in today's economic climate where talent has become a key competitive advantage, a talent strategy that includes training is critical to any organization's business strategy.

ABOUT THE AUTHOR

Ee-Leen C
A Learning & development enthusiast who spends her time as a career coach and leadership facilitator helping people get to an 'Aha!' moment in their career trajectories

P-MAX

Maximise Your Potential

A Place-and-Train Programme for
Professionals, Managers, Executives and Technicians

u sme
an NTUC initiative

Receive One-off Grant $5,000*

PROGRAMME CRITERIA:

1. Enrol newly-hired PMETs (within 90 days) in the PMAX programme

2. Complete required training for supervisors and newly-hired PMETs at a subsidised fee for Singaporean and PRs

3. Complete post-training evaluation conducted by U SME for supervisors and newly-hired PMETs for 6 months

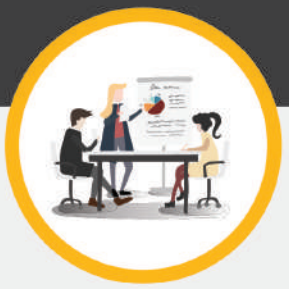
*Terms and conditions apply.

WHAT IS P-MAX?

P-Max is a Place-and-Train Programme for Professionals, Managers, Executives and Technicians (PMETs) which aims to:

Help small and medium-sized enterprises (SMEs) recruit, train, manage and retain newly hired PMETs.

Enhance communication between supervisors and newly hired PMETs and suggest progressive HR practices for implementation such as goals setting, performance management.



Guide newly hired PMETs to adapt to the new work environment and encourage staff retention in SMEs.

UPCOMING SESSIONS (2019)

For more details on P-MAX, please email: **p-max@ntuc.org.sg**

	DATE	DAY	SME SUPERVISOR WORKSHOP	PMET WORKSHOP
JAN	16	WED	★	
	17-18	THU-FRI		★
FEB	20	WED	★	
	21-22	THU-FRI		★
MAR	6	WED	★	
	7-8	THU-FRI		★
APR	10	WED	★	
	11-12	THU-FRI		★
MAY	8	WED	★	
	9-10	THU-FRI		★
JUN	12	WED	★	
	13-14	THU-FRI		★
JUL	10	WED	★	
	11-12	THU-FRI		★
AUG	28	WED	★	
	29-30	THU-FRI		★
SEP	11	WED	★	
	12-13	THU-FRI		★
OCT	9	WED	★	
	10-11	THU-FRI		★
NOV	6	WED	★	
	7-8	THU-FRI		★
DEC	4	WED	★	
	5-6	THU-FRI		★

SME SUPERVISOR WORKSHOP

1 DAY

S$500* per pax (before funding)

S$53.50* per pax (after funding)

This programme aims to help SMEs build progressive HR practices in the organisation. Participants will learn the types of strategies they should adopt to coach, manage and develop their employees.

With the Performance Management toolkit, the programme helps to:

- Improve effective leadership in the organisation
- Establish open and continuous communication between the supervisors and newly hired PMETs
- Plan strategies to improve performance at work

PMET WORKSHOP

2 DAYS

S$1,500* per pax (before funding)

S$160.50* per pax (after funding)

This programme aims to help newly hired PMETs adapt and adjust to working in SMEs. Participants will learn how to cope and work effectively in the new environment.

Upon completion of the programme, PMETs will be able to:

- Improve the working relationship between co-workers
- Leverage on their strength to take on challenges at work
- Manage and monitor personal performance
- Implement learning and development action plans by using the Performance Management Toolkit

*Terms and conditions apply.

An Initiative By: Workforce Singapore

Program Manager: sme an NTUC initiative

Appointed Training Provider: ntuc LearningHub an NTUC Social Enterprise

FINDING THE RIGHT MATCH

Picture this, you're a small- and medium-sized enterprise (SME) boss just starting your business. When you first start, you're a one-person show.

You have no employees and no human resource experience to know how to being the hiring process should be even if you wanted to hire.

That was Royal Wings General Manager Diana Ho when she first started the travel agency back in 2013. The SME focuses on providing travel services for companies who want to travel aboard for conferences or team-building activities. Destinations include Indonesia, Japan, Malaysia, Thailand and Korea.

"We started in 2013. At the time, I was the only one in the company. I was doing everything from customer service to handling the travel itinerary, to the sales and marketing. I started to hire staff, but the HR process was quite basic back then," she said.

Today Diana has four employees working for her. One of whom was hired through the P-Max programme, an Adapt and Grow initiative.

RECRUIT, TRAIN AND RETAIN

The programme aims to help SMEs better recruit, train, manage and retain their newly hired Professionals, Managers, Executives and Technicians (PMETs). It also gives SMEs the know-how to establish better communication channels between management and staff, adopting progressive HR practices.

For job-seeking PMETs, it helps them match with suitable SMEs. SMEs that complete the six-month follow-up and retain their newly hired employee will be eligible for a one-off grant of $5,000.

As one of the first NTUC U SME partners to embark on the programme, Diana said: "The programme was an eye-opening experience for me. Through the workshop, I learnt how to implement good HR practices such as setting goals for my staff and making clear their KPIs."

Two years on, the staff that went through the P-Max programme is still with Royal Wings.

"It's not a one-off thing. Even though companies can only go through the P-Max initiative once, the take away from the scheme has a lasting effect. Today, even without an HR department, I know what entails good hiring practices and what doesn't. I give my staff clear guidelines of what is expected of them, so there is no confusion between us," added Diana.

As a U SME Advocate, Royal Wings is now getting other SMEs on board the scheme.

"As a company that has benefited from the initiative, I recommend this programme with NTUC to other SMEs who are looking to strengthen their HR practices and hire suitable candidates for the jobs," said Diana.

Contributed by Labourbeat.org

For more information on the P-Max programme, visit https://www.pmax-usme.sg/

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- Priority in customised talent outreach programmes

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