Media Release
20 September 2017

Electronics Industry Transformation Map

Building the Electronics Industry of Tomorrow

1. Mr S Iswaran, Minister for Trade and Industry (Industry), launched the Electronics Industry Transformation Map (ITM) today at the opening of JTC nanoSpace @ Tampines. Developed by a multi-agency team together with industry partners, unions and trade associations, the ITM maps out strategies that will build the electronics industry of tomorrow. Through the ITM efforts, the industry is expected to achieve a manufacturing value-add of S$22.2 billion and introduce 2,100 new PMET jobs by 2020.

The Singapore Electronics Industry – A Key Sector of Growth

2. The electronics industry is a key sector of growth for Singapore's economy and is poised for continual growth. Starting out with labour-intensive system assembly of consumer products in the 60s, Singapore's electronics industry has since transformed to the manufacture of high-value components, such as RF filters and semiconductor integrated circuits. In 2016, electronics manufacturing contributed 4.4% to Singapore's GDP, accounting for close to S$90 billion in manufacturing output, and employing about 70,000 workers.

3. The emergence of new applications areas such as autonomous vehicles, artificial intelligence and healthcare, which are enabled by electronics, has brought about new growth opportunities for the industry. These new applications will drive greater diversity of demand for electronics and advancements in hardware. To tap into these opportunities, companies are embracing open innovation as a means to co-innovate and co-develop system solutions with their partners.

4. To prepare Singapore to tap into these global trends and opportunities, the ITM has identified a two-pronged strategy to ensure the continual growth of the electronics industry – firstly, to diversify into new growth markets, and secondly, to transform the existing base of electronics manufacturing and attract new investments in high-value components. The ITM will also focus on growing a strong pipeline of local talent, and upgrading the industry associations to better support the industry.

Diversifying into New Growth Markets

5. The Government will strengthen the innovation ecosystem to harness new growth opportunities and support companies in developing new capabilities. Singapore will convene multi-party innovation platforms to create new solutions and shorten innovation cycles. This will bring together MNCs, SMEs and public agencies, to collaborate and develop new solutions.

6. One example is the Nanyang Polytechnic's IoT Open Innovation Community, a network that was set up in 2015 with SPRING's support to enable SMEs to connect with technology and commercialisation partners, research institutions and other industry players for co-innovation. Today, there are more than 150 members on this platform coming together to jointly develop new IoT solutions. More technology platforms will be set up to help companies bring ideas into products.

7. To better support enterprises, the Government will foster collaborative projects between MNCs, SMEs and startups. They are encouraged to leverage the Partnerships for Capability Transformation (PACT) scheme for knowledge transfer, capability upgrading and co-development of new solutions. To enable enterprise growth, support is available to incubators and accelerators through the Startup SG Accelerator programme by SPRING to catalyse growth opportunities for IoT and electronics startups. (Please refer to Annex A for more information initiatives by SPRING.)

Transforming and Growing Electronics Manufacturing

8. Singapore will continue to transform the industry to attract high value-add activities and capture new growth areas. The provision of future-ready infrastructure is key to enabling companies to make investment decisions quickly and JTC nanoSpace is a prime example of this. The facility, developed in close consultation with the industry, is strategically located within Tampines Wafer Fab Park. It offers a plug-and-play, quick-start space solution that meets the stringent operational requirements of semiconductor manufacturers. JTC will continue to invest in next-generation infrastructure solutions and innovative spaces to support the growth of local and global companies. (Please refer to Annex B for more information on JTC nanoSpace.)

9. The Government will also work with companies to improve their manufacturing efficiency and adopt advanced manufacturing technologies. This will bring about an increase in manufacturing productivity by reducing operating costs and optimising resources. The ITM targets for 100% of manufacturing plants in Singapore to be best-in-class compared to their global operations. Advanced manufacturing will also bring about new skilled job roles in manufacturing such as system engineers and automation technicians.

Ensuring Good Jobs for Singaporeans

10. The transformation of the electronics industry is expected to bring about 2,100 new PMET jobs by 2020. To equip Singaporeans with the necessary skills to take on these jobs, SSG, WSG and the economic agencies, together with industry stakeholders such as employers, industry associations, unions, and education and training institutions have launched the Skills Framework for Electronics.

11. The Skills Framework identifies two career pathways – the technical and engineering track, and the management track – covering 29 job roles, which individuals can explore career growth along or across. It also provides key information on the sector, and lists the 58 skills and competencies required, that include emerging skills and competencies, and the relevant training programmes for them. Emerging skills and competencies identified include those in the areas of Artificial Intelligence

(AI), Internet of Things, Data Analytics, Robotics and Automation. The local workforce would need to ready themselves with these skills to meet upcoming challenges facing the industry. (Please refer to Annex C for more information on Skills Frameworks.)

12. The Skills Framework also informs of other key initiatives which support those in the electronics industry on their skills and career journey. These include the SkillsFuture Earn and Learn Programme, Enhanced Internship, Singapore Industry Scholarships and Professional Conversion Programmes (PCPs).

13. As part of WSG's Adapt and Grow initiative, PMETs can tap onto the PCPs to help them reskill and transit into a new industry. To support the shift towards higher value jobs, two new PCPs for the Electronics industry were launched today to prepare Singaporean PMETs with the necessary skills and also concurrently reskill talent from other sectors. The PCP for Electronics Engineer and the PCP for Electronics Assistant Engineer are in addition to four existing PCPs rolled out in 2016 to reskill PMETs for the Wafer Fabrication and Assembly & Test sectors. The four existing PCPs have since benefited close to 130 PMETs. (Please refer to Annex D for more information on PCPs.)

14. EDB and WSG will be co-organising an Adapt and Grow Career Fair for the electronics sector on 26 September with 20 companies offering more than 600 job vacancies. (Please refer to Annex E for more information on the Adapt and Grow Career Fair.)

Trade Associations and Chambers as a Key Partner

15. Taking a broader industry perspective, the Government will partner with Trade Associations and Chambers (TACs) such as the Singapore Semiconductor Industry Association (SSIA) to transform the industry. In support of the ITM, SSIA has set out a three-year plan to transform its charter and expand its resources to better support the industry. SSIA has already taken an active role in key industry programmes such as serving as the administrator of WSG's PCP. The association has also embarked on a leadership programme to jointly groom the next generation of local leaders for the industry. (Please refer to Annex F for media release by SSIA.)

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About the Singapore Economic Development Board (EDB)

EDB is the lead government agency for planning and executing strategies to enhance Singapore's position as a global business centre. EDB dreams, designs and delivers solutions that create value for investors and companies in Singapore. Our mission is to create for Singapore, sustainable economic growth with vibrant business and good job opportunities.

For more information on EDB, please visit www.sedb.com

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Annex A

INITIATIVES BY SPRING

Nanyang Polytechnic (NYP)'s Open Innovation Community

With SPRING's support, the NYP's Centre of Innovation for Electronics set up the IoT Open Innovation Community, which is a synergistic open innovation network that brings together enterprises, technology partners, research and knowledge institutions and relevant industry catalysts to explore, experiment, collaborate and exploit the potential of the Internet of Things for new business innovations, opportunities and growth.

The IoT Open Innovation Community provides a platform to:

- Establish networks among participating members and develop thematic programmes to stimulate business and services innovation leveraging on IoT technologies
- Initiate partnership and collaboration between enterprises and lead-demand organisations to co-innovate IoT solutions to optimise/enhance existing businesses and to establish new markers
- Partner participating players to establish sharing platforms for technology insights and development, market scans and analysis, access to IPs and capabilities development
- Collaborate with technology partners to develop platforms and application cases/models for rapid adoption and adaptation

- Examples of companies that found partners and developed solutions through NYP's Open Innovation Community:

  - Cyclect Electrical Engineering Pte Ltd, was able to quickly identify and work with a technology partner in electronics and IoT to jointly design and implement an innovative control mechanism used in guided vehicles for smart mobility solutions.

  - Local SME Sigenic was able to find collaboration partners in embedded electronics and IoT to design and develop ground breaking solutions to capture and analyse machine data for predictive maintenance and quality analytics for the manufacturing industry through the community.

SPRING's Partnerships for Capability Transformation (PACT)

Under the Partnerships for Capability Transformation (PACT) initiative, SPRING works with large organisations (LO) to identify and implement collaborative projects between LO and local SMEs in areas of:

- Knowledge transfer from an LO to at least one SME
- Capability upgrading of an LO's new or existing suppliers
- Development and test-bedding innovative solutions between an LO and at least one SME

- Examples of **PACT projects**:

    - Intel supported local SME Third Wave Power to build and market a solar-powered IoT solution.

    - Semiconductor firm NXP assisted local SME Styl Solutions to develop NFC-based (near-field communication) vending machines for Sentosa.

List of existing incubators and accelerators for electronics and IoT:

1) Jungle Ventures: Focus on IoT
2) TNB Accelerator: Focus on IoT, AR/VR, robotics, machine learning/artificial intelligence
3) Silicon Solution Partners: Focus on electronics
4) Green Meadows Accelerator: Focus on advanced manufacturing and Cleantech
5) Focustech Ventures: Focus on IoT, Advanced manufacturing, robotics, machine learning/artificial intelligence, AR/VR
6) Advanced New Technology Incubator (ANTI): Focus on hardware, robotics, automation
7) AIRmaker: Focus on IoT in the area of smart cities and digital health

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Annex B

JTC NANOSPACE @ TAMPINES

Located in Tampines Wafer Fab Park, JTC nanoSpace is the newest addition to JTC's suite of next-generation industrial facilities. Developed in close consultation with the industry, nanoSpace is a purpose-built development that meets the stringent requirements of niche semiconductor manufacturers. The development is designed to offer companies a quick-start space solution, which shortens their time-to-market, and is suitable for a single large user or multiple tenants.

Specifications

Land Area	1.31 ha
URA Zoning	B2
Plot Ratio	1.74
Gross Floor Area	22,900 square metres
Number of Storeys	4 storeys
BCA Certification	Green Mark Platinum Award
Temporary occupation permit (TOP) granted	March 2017

Photo Credit: JTC

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Annex C

FACTSHEET ON SKILLS FRAMEWORK BY SKILLSFUTURE SINGAPORE

About Skills Framework

1 The Skills Framework is an integral component of the Industry Transformation Maps and it is co-created by employers, industry associations, unions, education and training institutions and public agencies for the Singapore workforce. The Skills Framework provides key information on sector and employment, career pathways, occupations/job roles, as well as existing and emerging skills required for the occupations/job roles. It also provides a list of training programmes for skills upgrading and mastery.

2 The Skills Framework aims to create a common skills language for individuals, employers, and education and training providers. This further facilitates skills recognition and supports the design of training programmes for skills and career development. The Skills Framework is also developed to build deep skills for a lean workforce, enhance business competitiveness and support employment and employability.

Who is it for?

3 The target groups for Skills Framework are as follows:

- **Individuals** who wish to join or progress within the sector will be able to assess their career interest, identify relevant training programmes to upgrade their skills and prepare for their desired jobs;

- **Employers** will be able to recognise these skills and invest in training their employees for career development and skills upgrading;

- **Education and training providers** can gain insights on sector trends, existing and emerging skills that are in demand, and design programmes to address the sector needs accordingly; and

- **Government, unions and professional bodies** will be able to analyse skills gaps and design appropriate SkillsFuture initiatives to upgrade the manpower capability and professionalise the sector.

Key components of the Skills Framework

4 The Skills Framework contains information on employment, career pathways, occupations/job roles, skills and competencies and training programmes*.

The key components include:

- Sector information – provide information on key statistics, trends and workforce profiles in the sector;

- Career pathways – depict the pathways for vertical and lateral progression for advancement and growth;

- Occupations and job roles – covers existing and emerging technical skills and competencies, and their respective descriptions; and

- Training programmes* for skills upgrading and mastery – provides information on training programmes which will help aspiring individuals and in-service employees acquire skills required for various jobs.

**The training programmes for the Skills Framework for Electronics are made available at www.skillsfuture.sg/skills-framework*

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Annex D

FACTSHEET ON PROFESSIONAL CONVERSION PROGRAMMES (PCPS) FOR ELECTRONICS ENGINEER AND ASSISTANT ENGINEER

1. As part of Workforce Singapore's (WSG) Adapt and Grow initiative to support mid-career Professionals, Managers, Engineers and Technicians (PMETs) jobseekers and help them move into new occupations and sectors, WSG worked with the Singapore Economic Development Board (EDB), the Singapore Semiconductor Industry Association (SSIA), and the electronics industry to develop two new Professional Conversion Programmes (PCPs) for the Electronics Industry. The PCPs integrates 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.

2. The two PCPs are 6-month programmes which operates on a Place-and-Train mode. PMETs are hired by participating companies before undergoing training through customised facilitated classroom training and structured On-the-Job Training (OJT). 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.

Diagram 1: Archetype of PCP for Electronics Engineer

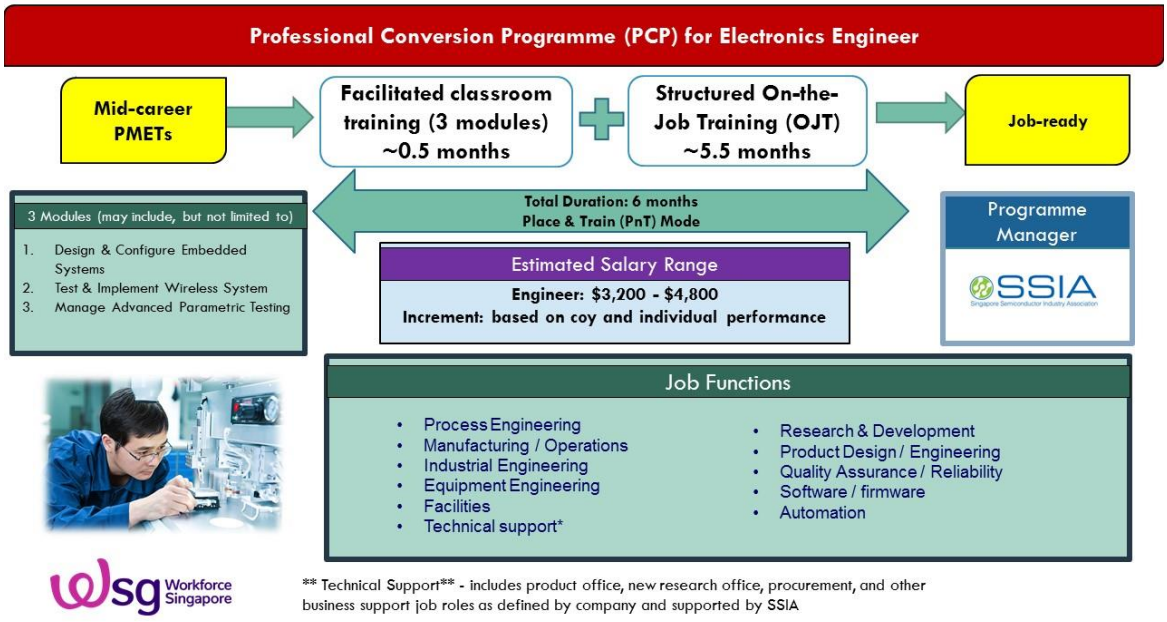
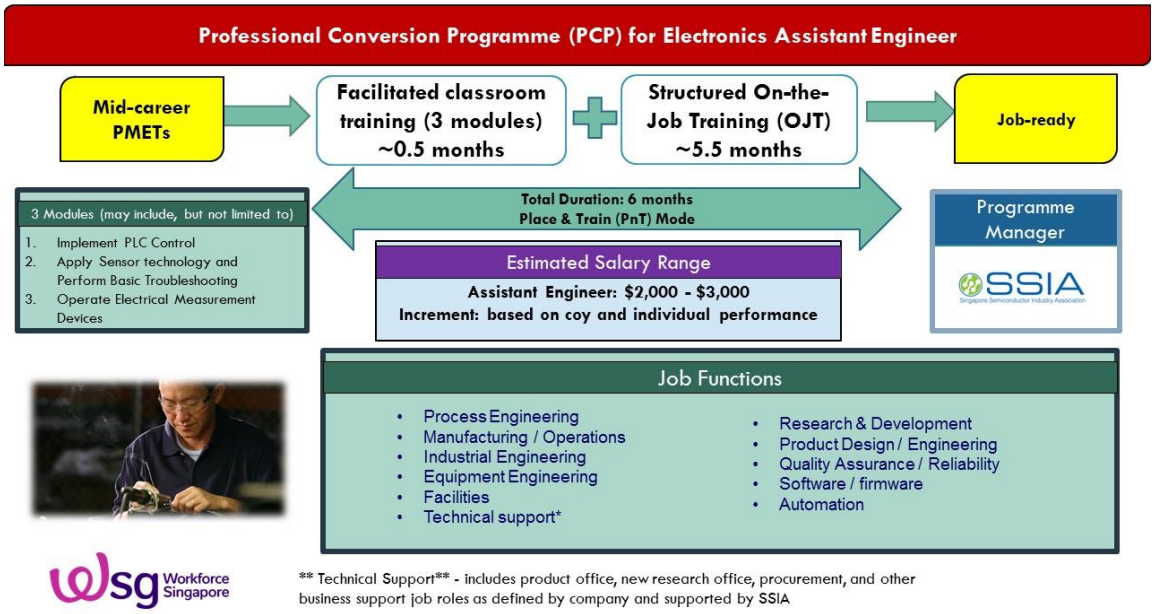


Diagram 2: Archetype of PCP for Electronics Assistant Engineer



Programme Support for Employers

3. The salary support during the period of training, for employers on board the PCP, will substantially lower their cost of hiring and re-skilling mid-career PMETs.

Funding to Employers by WSG	Standard Rate	Enhanced Rate
Salary Support	Up to 70% of monthly salary (capped at $4,000 per month) *For Singapore Citizen (SC) or Permanent Resident*	Up to 90% of monthly salary (capped at $6,000 per month) *For Long-term Unemployed[1] Singapore Citizen (SC) trainees or mature SC trainees aged 40 and above*

[1] Defined as being unemployed and actively seeking employment for six months or more.

Eligibility Criteria

4. Candidates must fulfil the following criteria:

- Be a Singapore Citizen or Singapore Permanent Resident;
- Minimum 21 years old;
- Must had graduated or completed National Service for at least two years;

5. Participating companies must fulfil the following criteria:

- Be registered or incorporated in Singapore;
- Able to offer employment directly related to the job which the PCP is for, with remuneration that is aligned with the market rate; and
- Commit to the PCP training arrangements for the PMETs that they have selected.

Application Process

The Singapore Semiconductor Industry Association (SSIA) has been appointed as the Programme Manager for the 2 new PCPs. For further information, please contact: pcp@ssia.org.sg

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Annex E

FACTSHEET ON ADAPT AND GROW CAREER FAIR FOR ELECTRONICS ON 26 SEPTEMBER 2017

The Adapt and Grow Career Fair for the Electronics Industry will be held on 26 September 2017, showcasing over 20 employers offering more than 600 vacancies in the Electronics Industry. In collaboration with the Singapore Economic Development Board (EDB), Workforce Singapore (WSG) organised the career fair to support the hiring demands in the electronics industry. The event will also help Singaporean PMET jobseekers better understand the various job opportunities offered by the industry as part of the Electronics Industry Transformation Map (ITM) launched on 20 September 2017.

Employers participating in the Adapt and Grow Career Fair for the Electronics Industry include ASE Singapore, GLOBALFOUNDRIES, Hitachi Chemical, Lumileds Singapore, Micron Semiconductor and STATS ChipPAC. Examples of the hiring vacancies include Associate Engineer, Mechanical Engineer, Process Engineer, Process Technical Specialist, Product & Test Engineering Senior Engineer, amongst many others.

Employers can tap on the Career Support Programme (CSP) to hire eligible experienced PMET jobseekers with a gross monthly salary of at least $3,600. They can also sign up as participating employers in the Professional Conversion Programmes (PCPs) for Electronics Engineers or Assistant Engineers, which reskills PMETs with the necessary competencies to take on new job roles in the electronics industry. Both programmes are part of the Adapt and Grow Initiative to help Singaporeans adapt to changing job demands and enhance their employability.

Industry previews and career talks will also be conducted for jobseekers to learn more about the growth of the Electronics Industry and for them to hear from employers on the requirements and skills needed for career and progression opportunities in the Electronics Industry.

Details of the Adapt and Grow Career Fair for Electronics Industry:

Date	**Venue**		**Time**
26 September 2017, Tuesday	Lifelong Learning Institute, Level 2, Event Hall 2-1	Industry Preview	9am to 10am
		Career Fair	10am to 5pm

To register for the Career Fair for Electronics Industry, please visit www.wsg.gov.sg/events or call 6883 5885 for more information.

About WSG (www.wsg.gov.sg)

Workforce Singapore promotes the development, competitiveness, inclusiveness, and employability of all levels of the workforce. Its key mission is to enable Singaporeans to meet their career aspirations, take on quality jobs at different stages of life, and help enterprises be competitive and manpower-lean. Workforce Singapore's focus is on strengthening the Singaporean core and ensuring that Singaporeans are able to have better jobs and careers. Workforce Singapore, in partnership with key stakeholders, also provides support to business owners and companies to enable them to transform and grow, while building a future-ready workforce

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Annex F

MEDIA RELEASE BY SINGAPORE SEMICONDUCTOR ASSOCIATION (SSIA)

SSIA poised to be a key partner for industry transformation

CK Tan, President, Singapore Semiconductor Industry Association (SSIA) said: "Singapore Semiconductor Industry Association is proud to be a key partner helping to spur transformation and build the electronics industry of tomorrow. We are well positioned to support the implementation of the Industry Transformation Map as we have been pro-actively implementing strategies to strengthen Singapore's position as a world manufacturing hub by driving research and development schemes, creating industry collaboration and business matching opportunities, offering skills development and accelerating development of the next-generation of talented leaders in our semiconductor and electronics industry."

Exciting Three-Year Plan to Support ITM

Woo Siew Wah, Managing Director, Singapore Semiconductor Industry Association (SSIA) Secretariat said: "Following on our successful implementation of the Singapore Semiconductor Vision 2020 initiatives, Singapore Semiconductor Industry Association is now tasked to drive a three-year plan that will spur the transformation of the local electronics industry by harnessing synergy among global multinational corporations (MNCs), start-ups and small and medium enterprises (SMEs) in various areas including design, manufacturing, capability enablement and business development."

Overview of SSIA's Plan to support ITM

The ITM presented by EDB clearly identifies the four pillars of transformation which are Productivity, Jobs & Skills, Innovation, and Trade & Internationalisation. SSIA's three-year plan to support these four pillars is as follows:

1. Deepen technical capabilities and strengthen electronics ecosystem in Singapore by continuing with current SSIA-driven initiatives which begun in 2015 under the Singapore Semiconductor Vision 2020 (SSV2020) aimed at enhancing the competitiveness of Singapore as a global semiconductor manufacturing hub. These initiatives are innovation in manufacturing operations, opportunities for technological

collaborations, and development of the next generation of leaders in the semiconductor industry.

2. Growing the talent and leadership pipeline by tapping on Manpower Development Programmes to attract fresh talent into the workforce with outreach and networking activities among young undergraduates and mature talent who are keen to enter this exciting industry, and to continue to enhance the skillsets of current workforce.

3. Creating a conducive and enabling business environment in Singapore by being the voice of the industry and developing platforms for greater participation among government agencies, SMEs, startups and MNCs across the industry's value chain and ecosystem.

4. Building a vibrant electronics community in Singapore through sharing of innovative ideas and business development sessions among SMEs, start-ups and MNCs.

About SSIA

Singapore Semiconductor Industry Association (SSIA) has more than 160 members today including companies and organisations throughout all parts of the complex and comprehensive value chain - IC design companies, Manufacturers, Fabless companies, Equipment suppliers, Photovoltaic companies, EDA and material suppliers, Training and service providers, IP companies, research institutes and Academia, as well as individual members. Since 2013, SME membership has grown exponentially and SMEs now account for close to half of SSIA's membership.

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