Challenges and Opportunities in Computer Science Executive Education

Tsinghua University's Global Forum on The Development of Computer Science

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Overview

- Background
  - Singapore
  - National University of Singapore
- NUS School of Computing's ongoing Experiment
- Reflections: Challenges and Opportunities

Background

There is a broader socio-economic background for this experiment:

- Singapore General Elections 2011 was prescient for many global events in hindsight

- Two general trends:

  - Restructuring of the economy with structural unemployment

  - Computing is fundamentally transforming society – it now touches practically all aspects of human society

Singapore's Response 1

- A lot of measures were introduced since the 2011 elections to alleviate the general economic anxiety

- A very bold step was taken in 2015:

  - Every adult Singapore citizen and permanent resident was given **$500 SkillsFuture credit** which could be used for doing any course
  - A new government office "SkillsFuture Singapore (SSG)" was set up to administer this

- This has become an annual feature since then - $500 per person per year

- This led to a boom in private-sector course providers

Singapore's Response 2

- In 2016, the funding was further increased to subsidize attendance of courses:
  - Those under age 40: 70% subsidy for SSG approved courses
  - Those above age 40: 90% subsidy for SSG approved courses
- A lot of the private-sector operators offered dubious courses of poor quality
- SSG introduced regulation to control quality
- The Ministry of Education requested the universities to step in to help

The NUS Response

NUS
National University
of Singapore

NUS Initiatives for Individuals

NUS LIFELONG LEARNERS

Special suite of over 700 short and regular courses across 10 disciplines for NUS Alumni

NUS 500

Comprehensive catalog of over 450 short and regular courses for members of the general public

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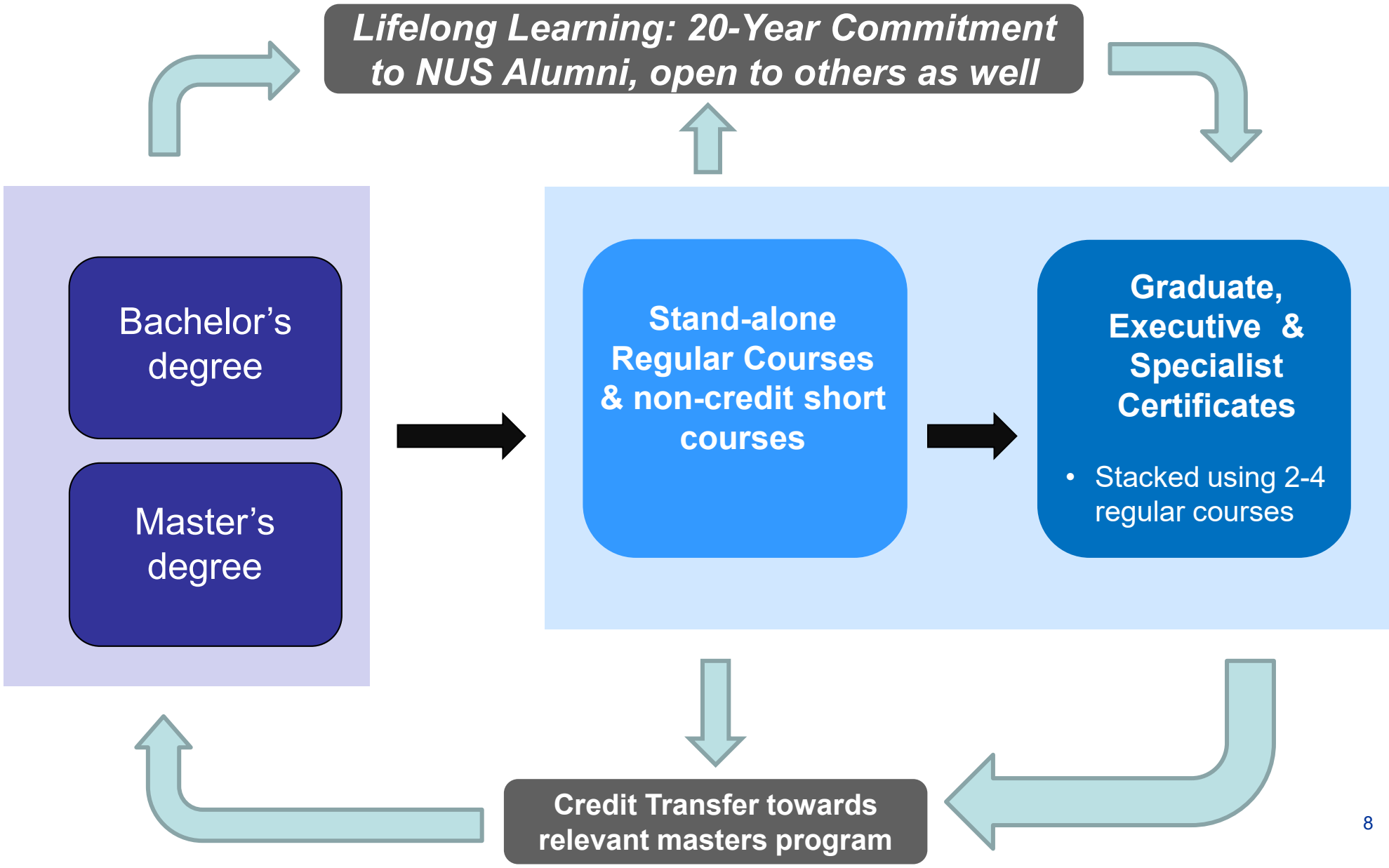
Open for Life



NUS Initiatives for Corporations

AYCL™

Tailored training for corporate partners

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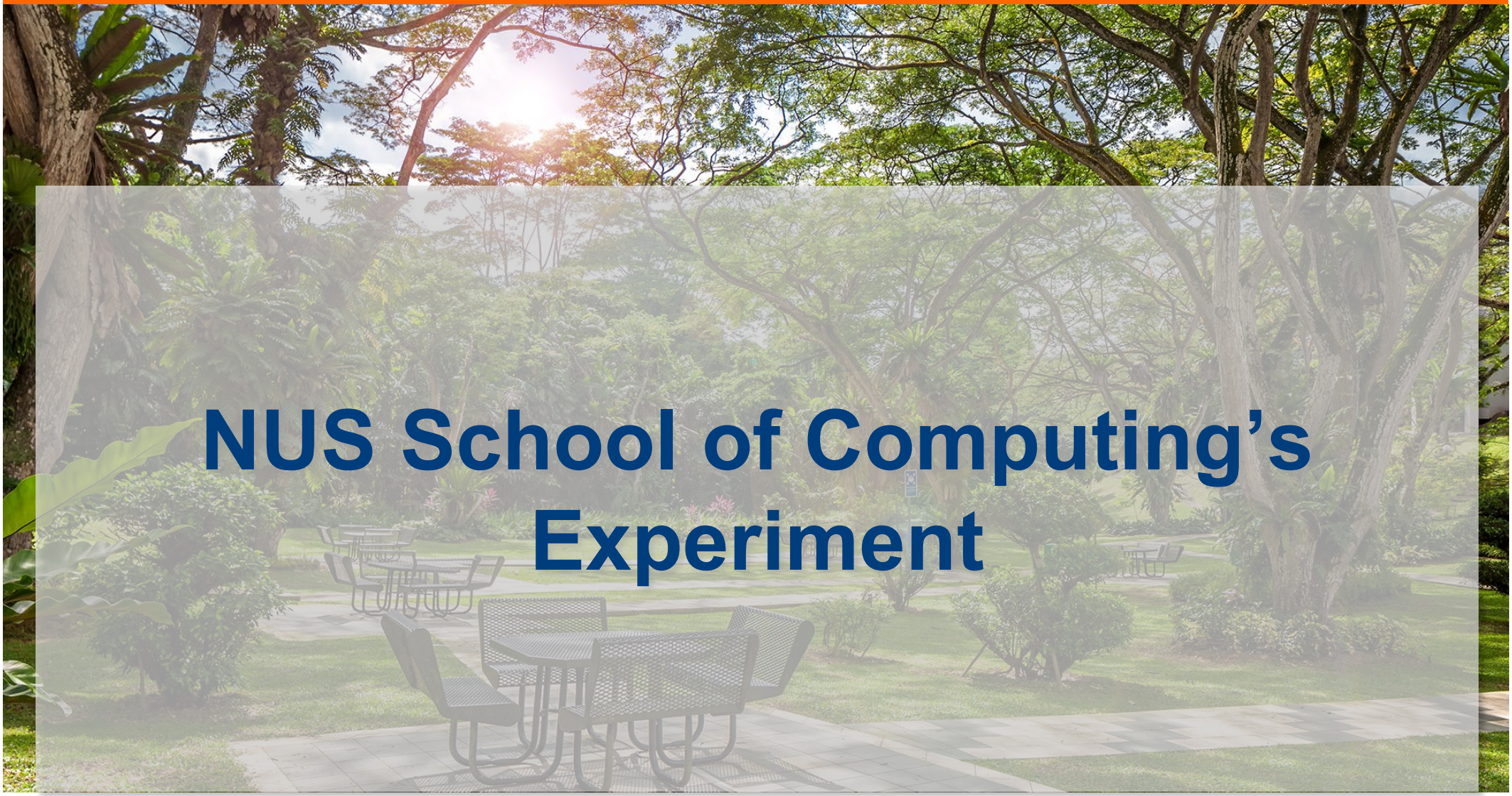


NUS School of Computing's Experiment

NUS
National University of Singapore

Computing and Executive Education???

- Executive Education has traditionally been associated with Business Schools
  - Doing Executive Education is part of their DNA!
- Because of the digitalization of the economy, they have seen a surge in demand to learn about AI, Data Science, IoT, Cloud Computing, Cyber-Security etc. from C-Suite executives and mid-level executives
- However, it is just not possible for Business Schools to do this
  - They did try to involve our professors in their offerings
- So, in 2018, we established the NUS School of Computing's "Advanced Computing for Executives" Center (ACE)

Advanced Computing for Executives -Why?

- We had several internal discussions and debates

- We have the expertise and hence we are better poised than a Business School

  - Given the urgent societal need, it is our responsibility
  - Accentuated during the pandemic

- It facilitates personal interaction with industry leaders and creates mind-share

- Leads to industry funding and/or data for research

- It helps our students (Undergraduate, Masters and PhD)

- It helps generate resources for the School

ACE's Main Target Groups

Senior / Upper Middle Management

- Master Class
- Customized Courses

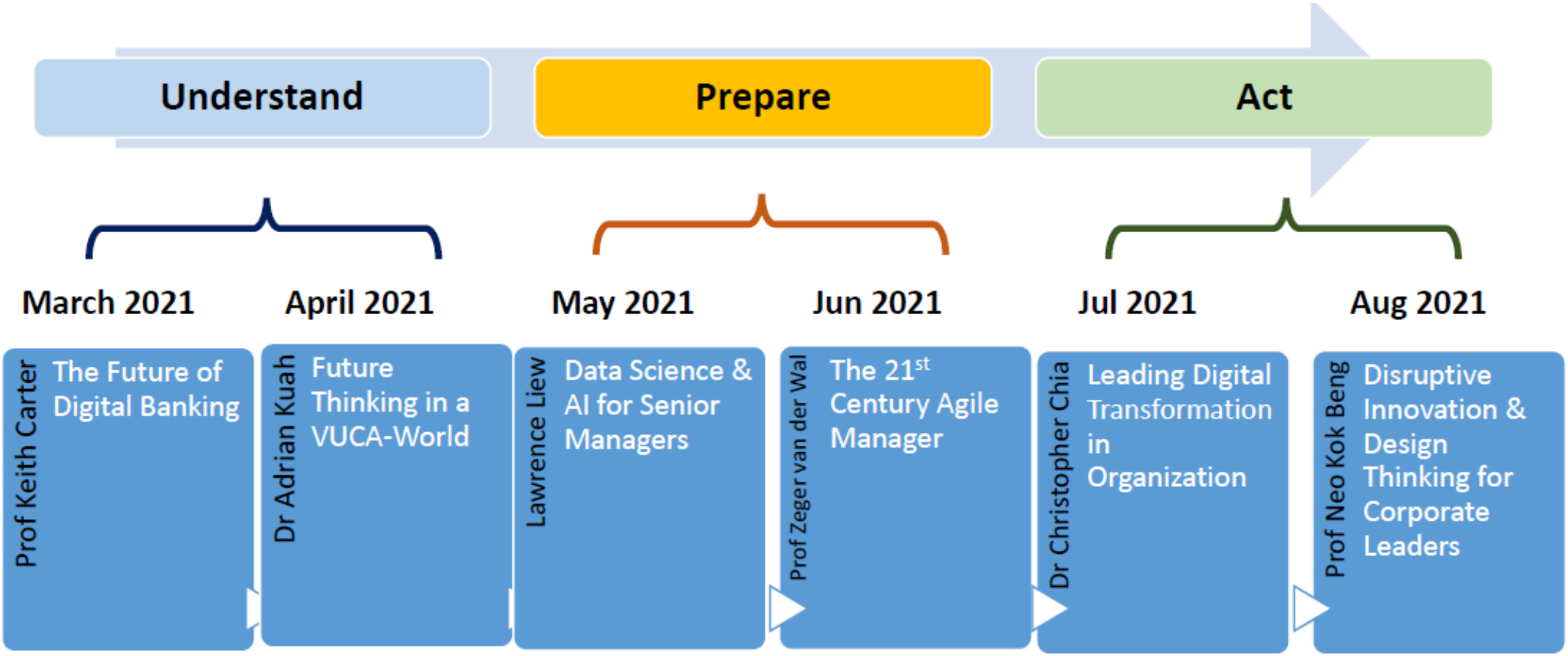
Professionals

- Specialist Programs
- Professional Certificates
- Collaborative Partners Programs

Vulnerable Executives

- Train and Place
- Place and Train

Master Class for Senior Executives



Certificate in Cybersecurity for Senior Executives

Day 1 (AM)	Day 2 (AM)	Day 3 (AM)	Day 4 (AM)
Technical Knowledge Made Simple (3.5 Hrs)	Technical Knowledge Made Simple (3.5 Hrs)	Strategic Cybersecurity Investment (3.5 Hrs)	Strategic Cybersecurity Investment (3.5 Hrs)
The Essence of Cybersecurity (Lecture)	Cybersecurity Hygiene (Lecture)	Stakeholders in Cybersecurity (Lecture)	Performance Metrics For Cybersecurity (Lecture)
Critical Vulnerable Spots (Lecture)	Preparing For Cybersecurity Disasters & Response (Lecture)	In-House Cybersecurity Team (Lecture)	Driving Outcome-Based Investments (Lecture)
Demystifying Cloud, IoT and VPN Security (Lecture)	Learn To Uncover Your Security Exposure (Class Practice)	Right-Sourcing: Staffing & Technologies (Lecture)	Learn To Critique A Cybersecurity Proposal (Class Practice)

Japan Go Digital!
- Japanese Digital Immersion Programme

Strategic Public Relations Bureau, Inbound Tourism Bureau, Emigration Promotion to Toyama Bureau, Statistical Research Bureau, Tax collection Bureau, Infrastructure Dev Bureau

Week	Week 1	Week 2	Week 3	Week 4	Week 5
Morning	- Introduction to the course - The need for Digitalization (LKYSPP)	- Intro to Robotic Process Automations (RPA) (SOC)	- Intro to Design Thinking and Toyama Situation (SOC)	- Raffles Care Case Study and Sharing (SOC)	- Data Analytics 2.0 – the Science and Art of Analytics (LKYSPP)
Afternoon	- Promoting and Regulating Digital Innovations (LKYSPP)	- Intro to Robotic Process Automations (RPA) (SOC)	- Design Thinking and Toyama Situation with RPA (SOC)	- Singapore's Smart Nation Strategy (LKYSPP)	- Using Analytics as an Evaluation Tool (LKYSPP)
Home-work	- Brainstorm and list policy challenges faced in Toyama prefecture / Japan				
Week	**Week 6**	**Week 7**	**Week 8**	**Week 9**	**Week 10**
Morning	- Using Business Analytics to Answer Business Questions: Introducing Power BI (SOC)	- Managing Data and Privacy (LKYSPP)	- Final Presentation preparation workshop (SOC)	- Final Presentations (SOC/LKYSPP)	- Publish results to Public
Afternoon	- Using Business Analytics to Answer Business Questions: Introducing Power BI (SOC)	- Best practices in Security (SOC)	- Final Presentation preparation workshop (SOC)	- Senior Management Review - Wrap-up (SOC/LKYSPP)	

ACE Digital Transformation Programme

Advanced Professional Certificate in Digital Transformation

Course Roadmap

Professional Certificate In Digital Transformation
Digital Strategy & Implementation

- Digital Business Strategy
- Market Solutions

Professional Certificate In Digital Transformation
Digital Tech & Operations

- Protecting Digital Assets
- Agility & Growth
- Technology for Productivity
- Talent & Culture

Professional Certificate In Digital Transformation
Digital Marketing & E-Commerce

- Digital Marketing
- Introduction to E-Commerce

Professional Certificate In Digital Transformation
Digital Capability & Agility

- Getting It Right From The Start
- Design Thinking: Creative Business Solutions
- User Case Generation,Selection & Priortisation
- Leadership & Agility

Cyber Security Programme

Higher Certificate in Cyber Security

Course Training Roadmap

Certificate in Cyber Security (Foundation)

- Python for Cyber Security
- Mastering Computer Networks
- Linux for Cyber Security

+

Certificate in Cyber Security (Intermediate)

- Operating Systems For Cyber Analyst
- Web Penetration Testing
- Network Forensics

+

Certificate in Cyber Security (Advanced)

- Network Penetration Testing
- Incident Response Diving Into Cyber Defence

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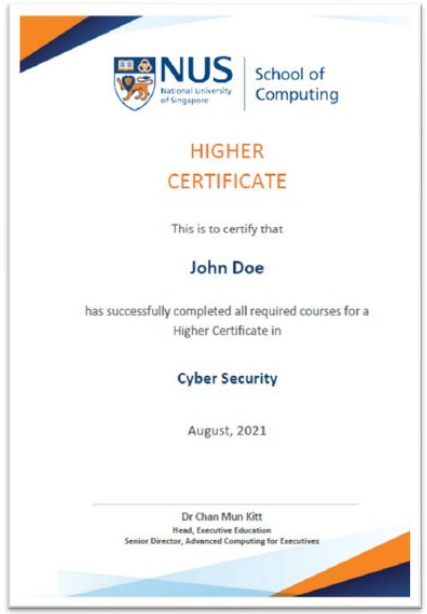

NUS National University of Singapore | School of Computing

HIGHER CERTIFICATE

This is to certify that

John Doe

has successfully completed all required courses for a Higher Certificate in

Cyber Security

August, 2021

Dr Chan Mun Kitt
Head, Executive Education
Senior Director, Advanced Computing for Executives

Each module is a 9 day course

Technology in Finance Immersion Program (Place & Train)

Nearly 1,000 applicants for 40 job vacancies cum training places

Professional Certificate In Business Analysis I

Business Analysis Planning & Monitoring	Strategy Analysis

+

Professional Certificate In Business Analysis II

Stakeholder Engagement	Requirement Analysis & Design	Vendor Assessment	Solution Development, Delivery & Evaluation

Participating financial institutions

ICBC 中国工商银行 INDUSTRIAL AND COMMERCIAL BANK OF CHINA

OCBC Bank

ntuc income

Partners Group REALIZING POTENTIAL IN PRIVATE MARKETS

Great Eastern

HONG LEONG FINANCE

JPMorganChase

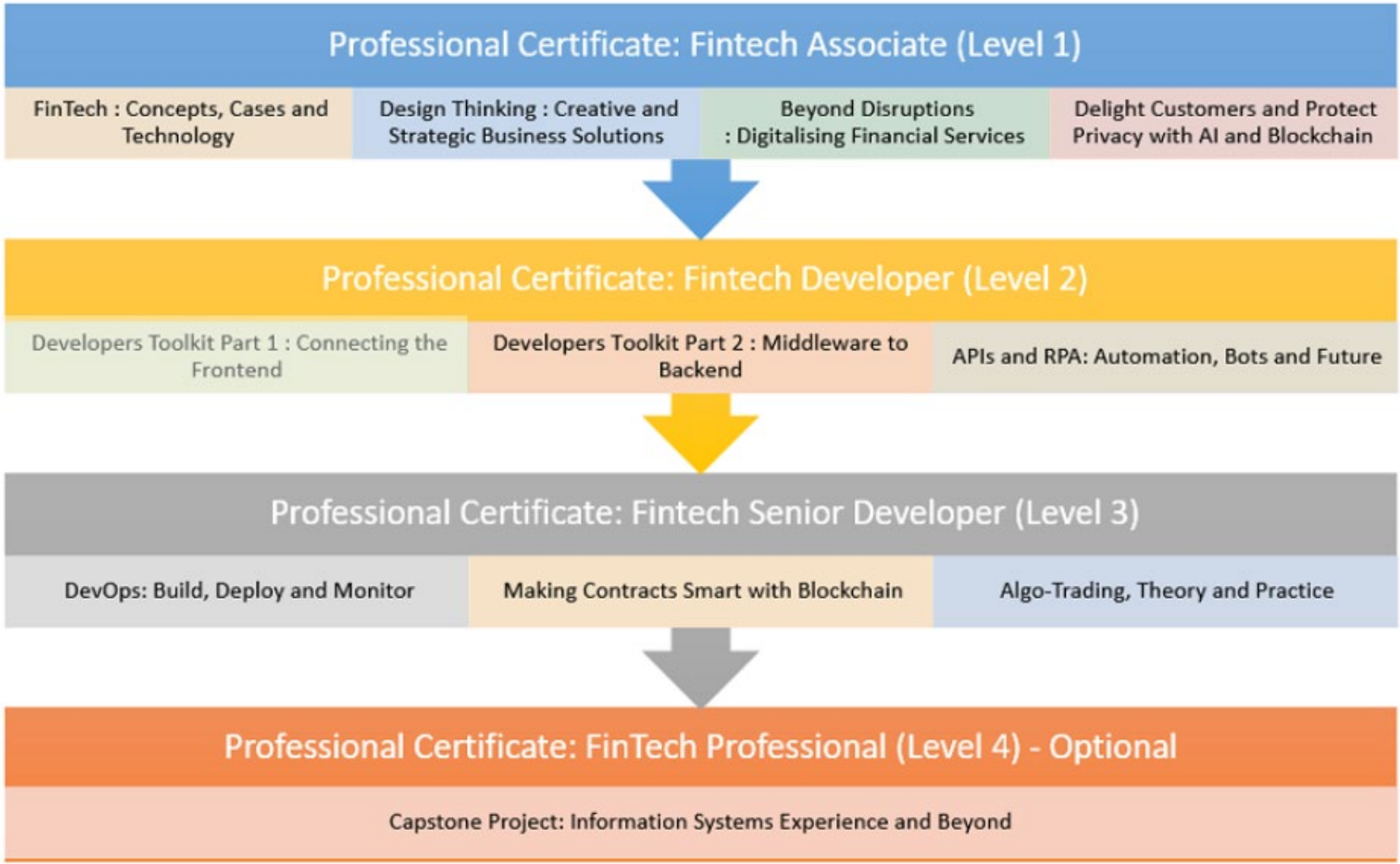
AIA

BARCLAYS

Deutsche Bank

FinTechSG Program (Train and Place)

Advanced Professional Certificate in FinTech



Training + Technology Consultancy

Part I
INSTRUCTIONAL COURES
2 to 3 months

1-day Foundation Workshop "Getting it Right from the Start

Awareness on Digital Transformation

School of X's Develop UX Maps workshop

3-day Workshop: Reimagining - user case generation, selection, and prioritization

From the re-imagination of digital experience and digital operations, a **LIST of Digital Initiatives identified**

2-day Workshop: Tackling "unknown unknowns" - DT leadership and agility

How to **tackle the "unknown unknowns"**, particularly in a rapidly changing environment and demographic configuration in Singapore (e.g., aging population, wealth, and health disparities) is being explored.

Part II
CONSULTANCY
12 to 18 months

- This consultancy part covers the **pilot-projects only, and not production, and scaling up**.
- The consultancy **does not include** the management of the vendors, supply of the needed IT manpower, and delivery of digital solutions.
- The pilot projects will be **governed by Research Collaboration Agreement (RCA) between NUS and each SSA.** The RCA will specify the project scope and cost including consultancy from NUS.

Reflection…

- Most Professors are not interested in teaching for Executive Education
  - Unlike Business Schools where it is prestigious to do so…
- We are trying to socialize our PhD Students by getting them involved
  - They are also not interested!
- There is a huge demand for "low-level" education
  - However, we just say no to that!
- Surprisingly strong interest in "Executive Education + Consultancy Project" model
  - Executive education for Senior Management, followed by implementation using Middle Management & other employees
  - We involve Professors as Consultants
  - We involve Undergraduate/Masters Students as Interns
  - This is something Business Schools are incapable of doing

Final Thoughts

- It is an on-going experiment which we will review in 2023…
- Too important a business to be left to Business Schools
- It helps in our Research
- It helps our students – as interns working on industry projects or teaching Senior Executives
- Collectively, we should discuss whether this is important for CS Departments and Computing Schools…

Thank you!