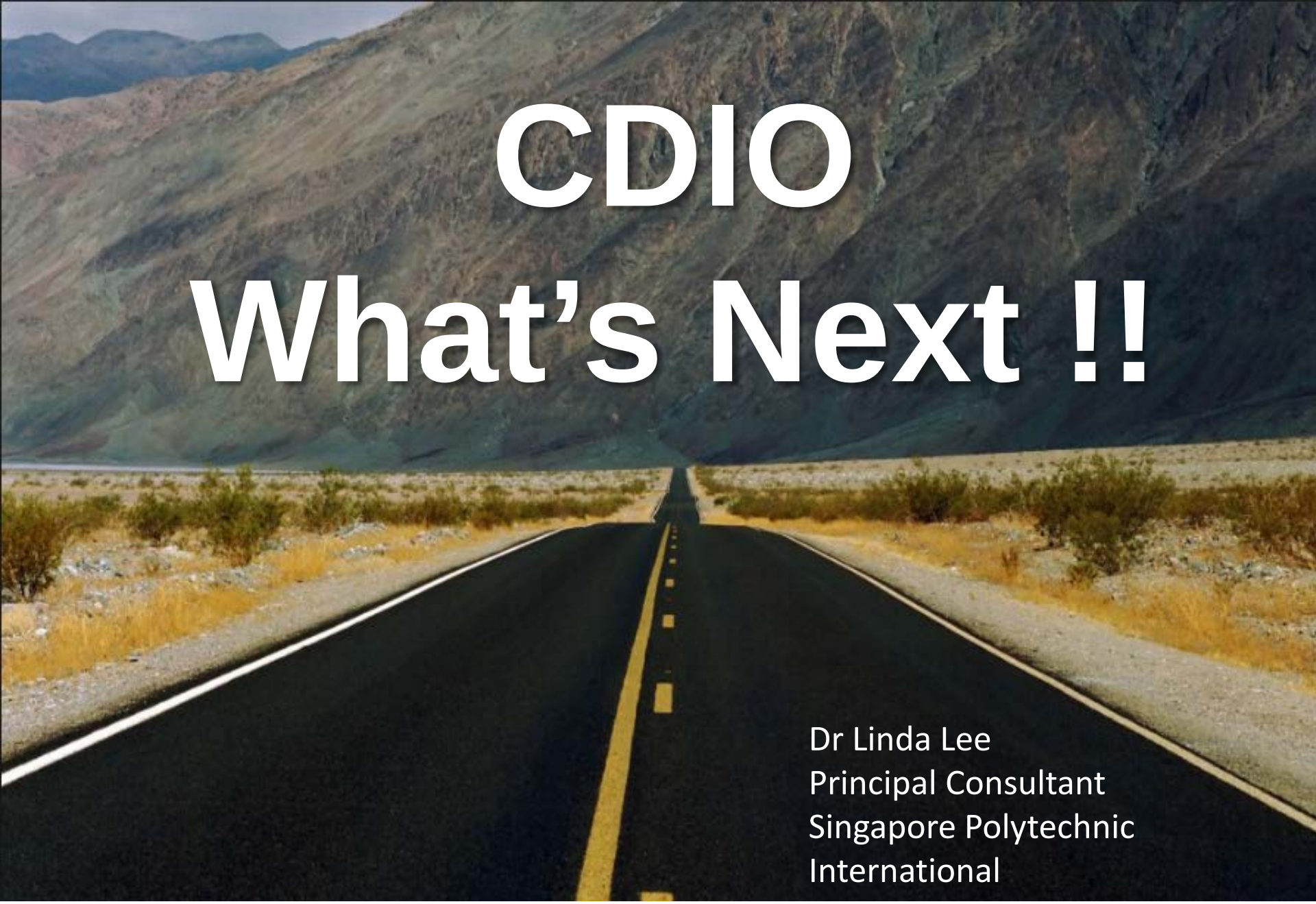

# CDIO
# What's Next !!

Dr Linda Lee
Principal Consultant
Singapore Polytechnic
International



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# OUTLINE OF TALK


- Introduction
- Educational Changes in SP
- Current CDIO Program
- What's Next – Advancing CDIO Program
- Issues and Challenges
- Partnership

# INTRODUCTION

Since 2011, SP worked with ASIA partner universities in implementing CDIO program, 1st phase

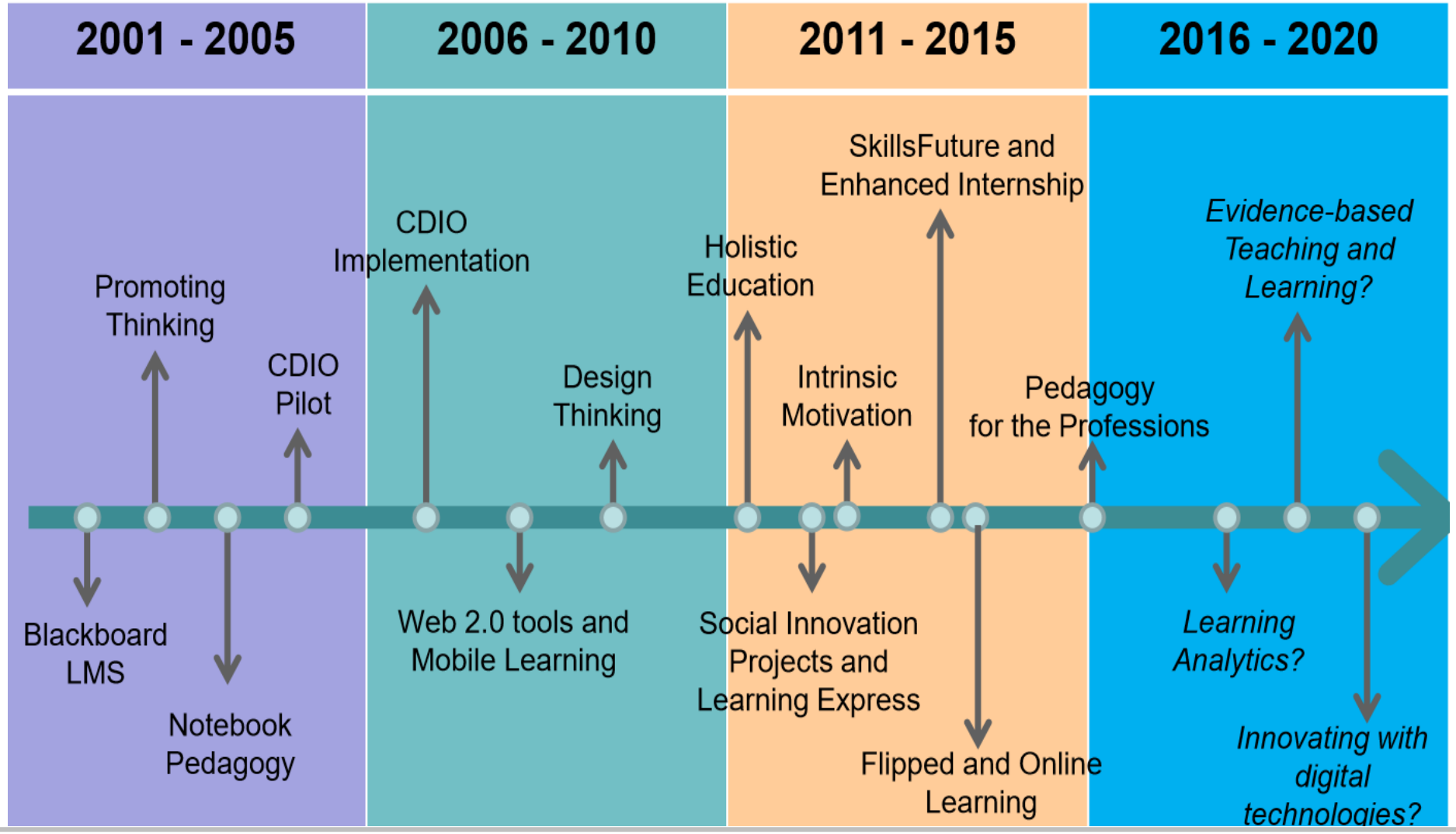
Share SP's experiences in redesigning curriculum in accordance to CDIO skillsets and CDIO standards

Since 2016, SP started the 2nd phase of CDIO implementation to meet the changing needs of industry and the new generation of students

Institutions seek to look broader and deeper at the current goals, visions and pedagogical foundation of CDIO

# EDUCATIONAL CHANGES IN SP

**PARTNERSHIP WITH OVERSEA IHLs IN CDIO SINCE 2011**



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# CURRENT CDIO PROGRAMME



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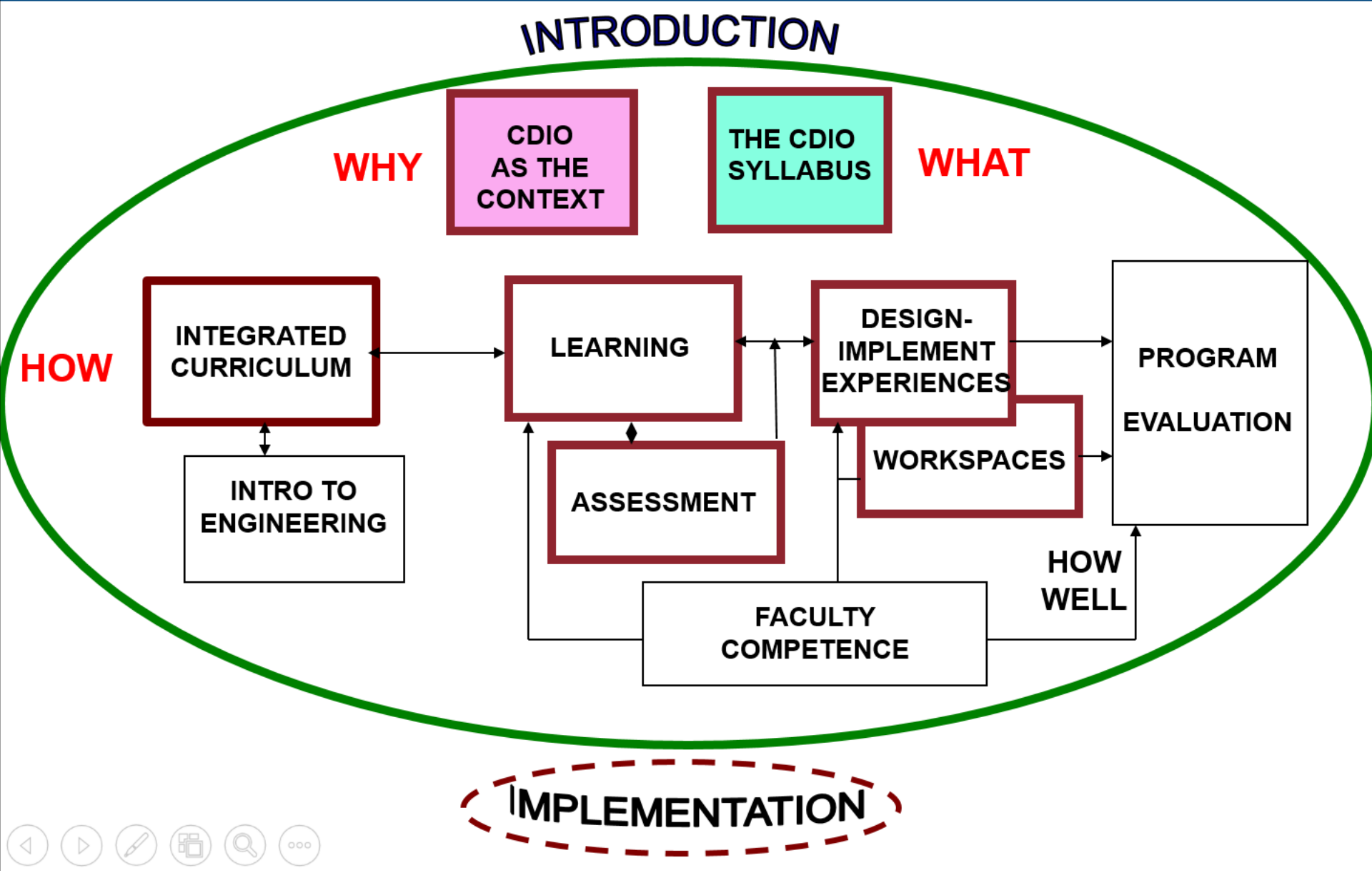
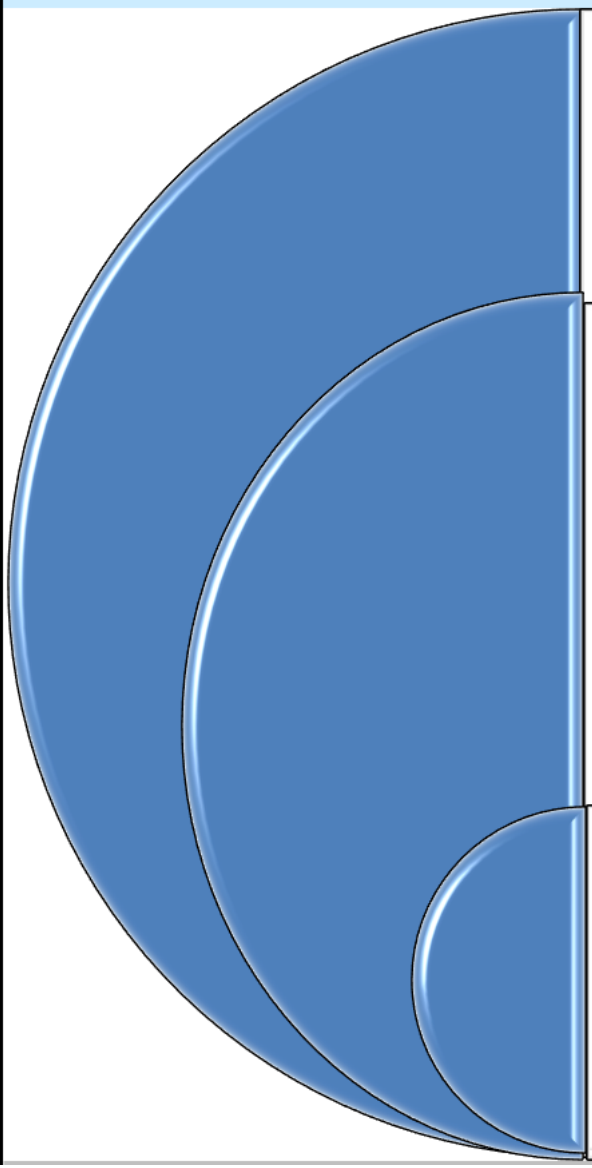
# CDIO STANDARDS



# CDIO PROGRAMME



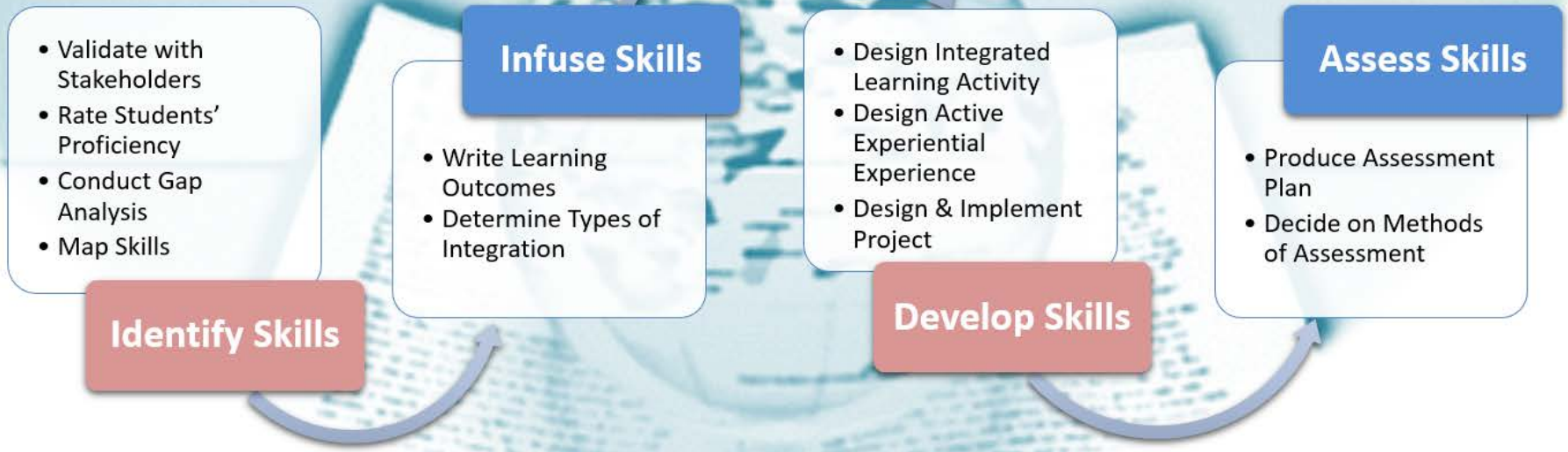
Stage 1- Building of Knowledge

Stage 2 - Redesigning Existing Curriculum

- Integrated Curriculum
- Design and Implement Experiences
- Active and Experiential Learning Experiences

Stage 3 – Evaluating the Impact of CDIO Implementation

# Roadmap to Integrated Curriculum



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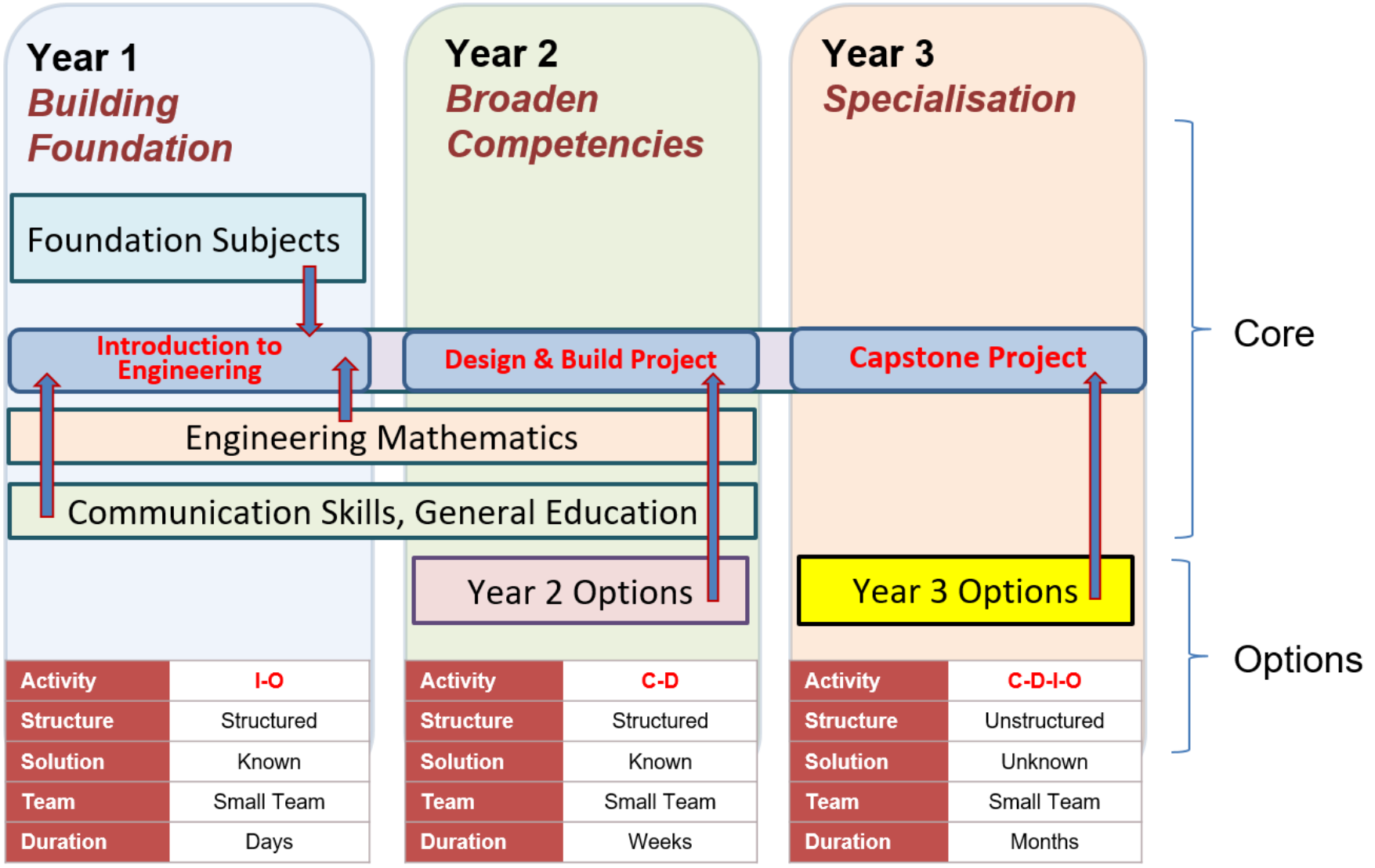
# DESIGN AND IMPLEMENT EXPERIENCE




| Activity | I-O |
|---|---|
| Structure | Structured |
| Solution | Known |
| Team | Small Team |
| Duration | Days |

| Activity | C-D |
|---|---|
| Structure | Structured |
| Solution | Known |
| Team | Small Team |
| Duration | Weeks |

| Activity | C-D-I-O |
|---|---|
| Structure | Unstructured |
| Solution | Unknown |
| Team | Small Team |
| Duration | Months |



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# ACTIVE EXPERIENTIAL LEARNING

The teacher's fundamental task is to get students to **ENGAGE IN LEARNING ACTIVITIES** that are likely to result in their **ACHIEVEING THE DESIRED OUTCOMES** in a reasonably effective manner.

[Shuell, quoted in Biggs 2003]


# SELF EVALUATION

IT'S TIME TO GET HONEST

## CDIO SELF-EVALUATION

## PROGRAM-LEVEL

**(Quality Control of Program)**

| Standard | CDIO STANDARD | EVIDENCE OF COMPLIANCE | CURRENT RATING | TARGET RATING | ACTIONS | TIMELINE |
|---|---|---|---|---|---|---|
| 1 | CDIO as Context<br><br>Adoption of the principle that product and system lifecycle development and deployment – Conceiving, Designing, Implementing and Operating - are the context for engineering education. | | | | | |
| 2 | CDIO Syllabus Outcomes<br><br>Specific, detailed learning outcomes for personal, interpersonal and product and system building skills, consistent with program goals and validated by program stakeholders. | | | | | |



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# WHAT'S NEXT - ADVANCING CDIO



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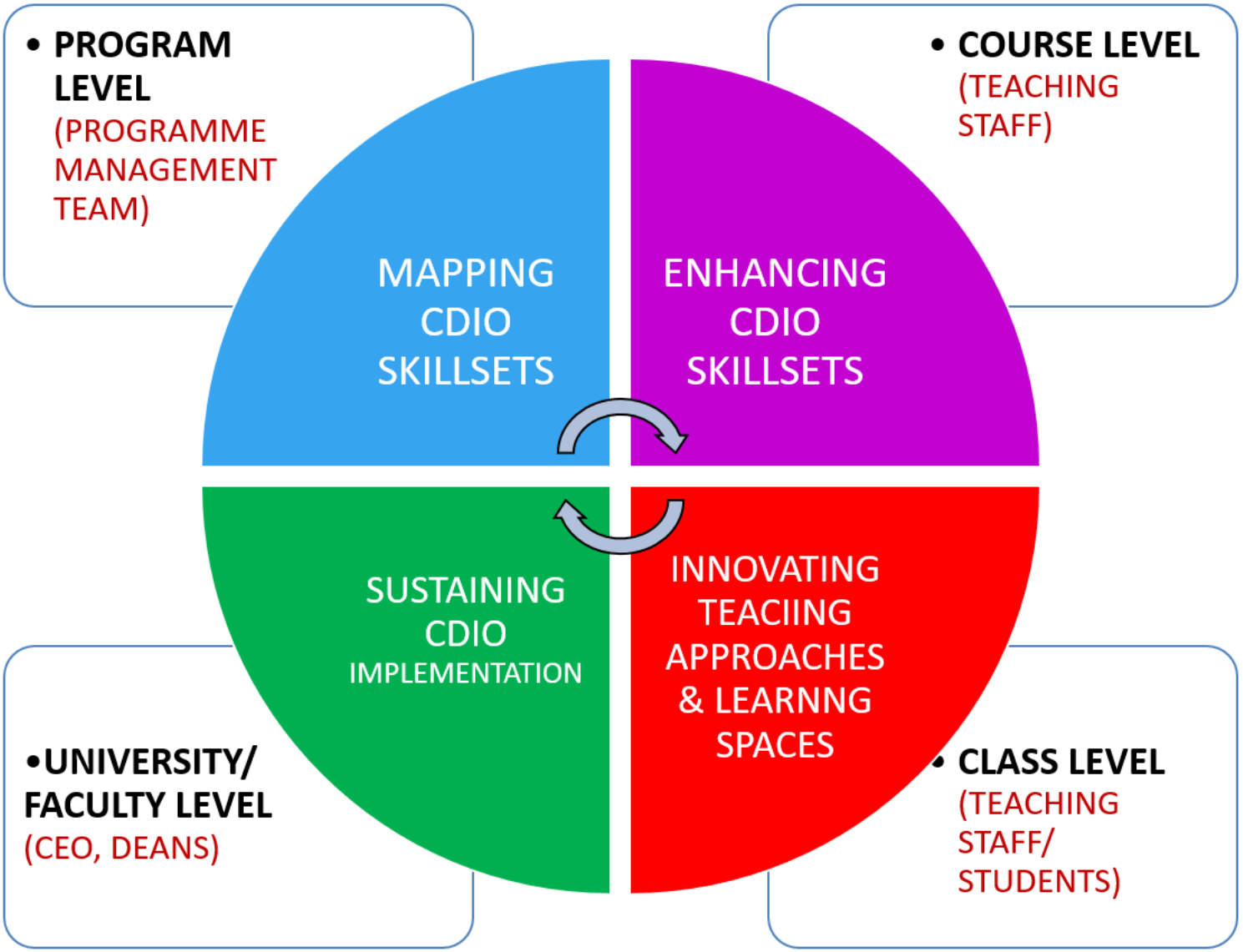
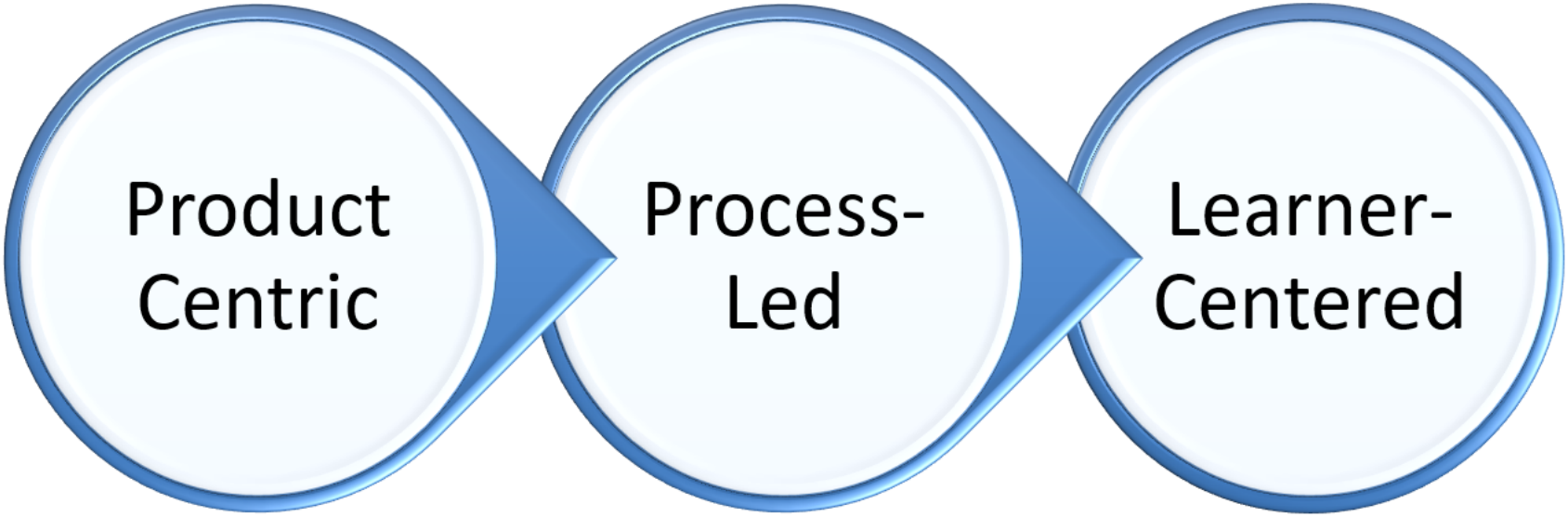
# ADVANCING CDIO PROGRAMME



# APPROACHES ADOPTED

## ADVANCING CDIO

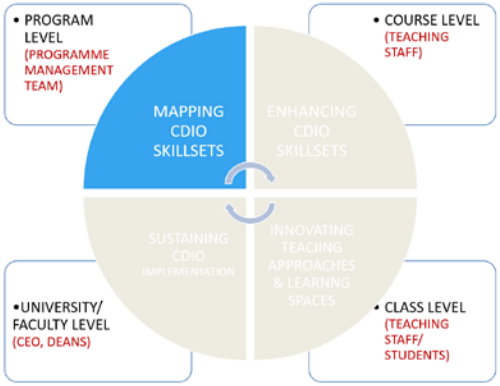


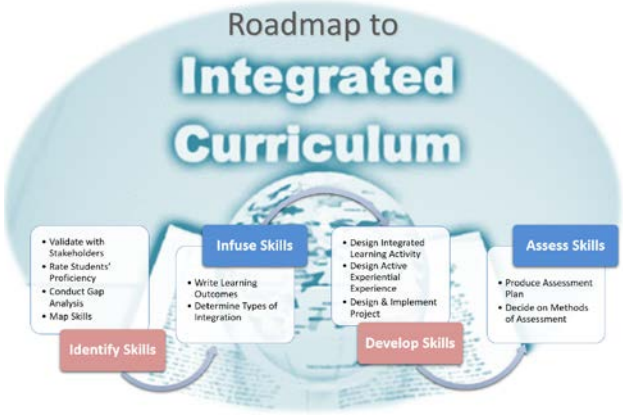

Standards and Skillsets

Roadmaps

Students' Experience

# MAPPING CDIO SKILLSETS




## Focus On The Future

Mapping CDIO Skillsets against the future graduates' attributes required by the rapidly changing industry in meeting future challenges.

Achieved By:

- Analysing Future Trends & the Implications
- Gaining Foresight on the Future of Work & New Competencies
- Defining Future Graduate Attributes
- Mapping CDIO Skillsets against Future Graduate Attributes



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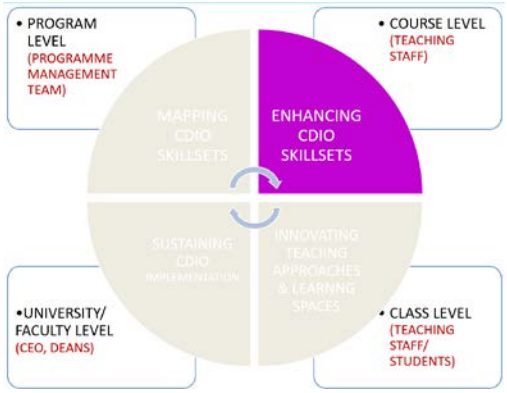
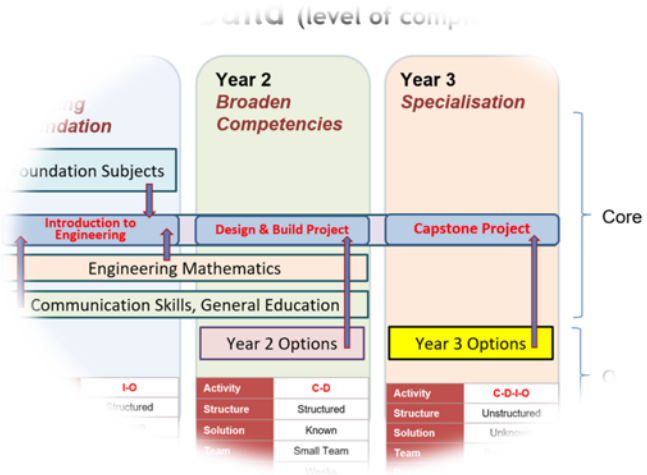
# ENHANCING CDIO SKILLSETS




## Raise Professional Practice

Students from different disciplines work together on multi-disciplinary projects.

Achieved by:

- Developing Design & Build Real-World Projects
- Establishing Cross-Functional Student Teams
- Creating Multi-Disciplinary Projects



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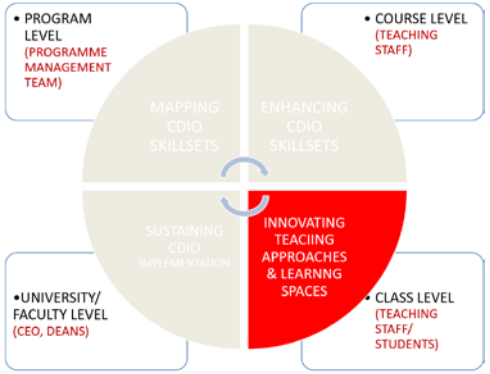
# INNOVATING TEACHING APPROACHES & LEARNING SPACES




## Focus on Conducive Learning Spaces

Innovating CDIO Learning and Space for creative teaching, learning approaches and learning space innovation

## Achieved by:

- Designing Ideal Student Learning Experience
- Creating Conducive Learning Space



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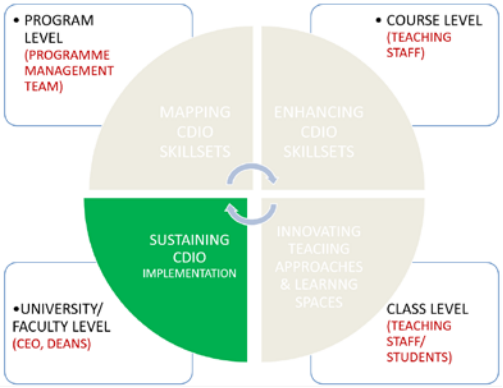
# SUSTAINING CDIO IMPLEMENTATION





## Emphasis on Quality

Support and monitor programme execution to facilitate advancement of CDIO.

Achieved by:

- Engaging in professional learning
- Engaging professionally with
  - colleagues
  - learning communities
  - relevant industry



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# PROGRAMME STRUCTURE FOR CDIO

| First Tier | | Second Tier | |
|---|---|---|---|
| **INTRODUCTORY WORKSHOP** | **SPECIALISTS WORKSHOP** | **MASTER TRAINERS WORKSHOP** | **CASCADING** |
| CDIO Teaching and Learning Framework | Designing Integrated Curriculum, Design-Implement and Active Experiential Learning | Facilitation Skills and Preparation of Training Materials for Cascading | Designing Integrated Curriculum, Design-Implement and Active Experiential Learning |
| Participants comprises:<br>• Educational Leader, such as Dean, Principals, Senior Admin/Acad Staff<br>• Faculty or Programme Developer<br>• Teaching Faculty | Participants selected from the Introductory workshop comprises:<br>• Senior Staff<br>• Faculty or Programme Developers<br>• Teaching Faculty | Participants selected from the Specialists workshop | Participants comprises:<br>• Educational Leader, such as Dean, Principals, Senior Admin/Acad Staff<br>• Faculty or Programme Developer<br>• Teaching Faculty |
| At least 100 participants from at least 3 IHLs | Not more than 60 participants | Not more than 20 participants | At least another 100 participants from the same and/or new IHLs |

# PROGRAMME STRUCTURE FOR ADVANCING CDIO

| First Tier | | Second Tier | |
|---|---|---|---|
| **INTRODUCTORY WORKSHOP** | **SPECIALISTS WORKSHOP** | **MASTER TRAINERS WORKSHOP** | **CASCADING** |
| Introduction to Advancing CDIO | Mapping, Enhancing and Innovating CDIO Skillsets<br>Sustaining CDIO | Facilitation Skills and Preparation of Training Materials for Cascading | Mapping, Enhancing and Innovating CDIO Skillsets<br>Sustaining |
| Participants comprises:<br>• Educational Leader, such as Dean, Principals, Senior Admin/Acad Staff<br>• Faculty or Programme Developer<br>• Teaching Faculty | Participants selected from the Introductory workshop comprises:<br>• Senior Staff<br>• Faculty or Programme Developers<br>• Teaching Faculty | Participants selected from the Specialists workshop | Participants comprises:<br>• Educational Leader, such as Dean, Principals, Senior Admin/Acad Staff<br>• Faculty or Programme Developer<br>• Teaching Faculty |
| At least 200 participants from at least 3 IHLs | Not more than 65 participants | Not more than 25 participants | At least another 120 participants from the same and/or new IHLs |



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# CURRENT CDIO PARTNERS

- 2011: Universiti Teknologi Malasia (UTM) and Universiti Teknologi MARA (UiTM) in Malaysia;
- 2012: Vietnam National University Ho Chi Minh City (VNU-HCMC) in Vietnam;
- 2012: Chulalongkorn University and Rajamangala University Thanyaburi in Thailand;
- 2013: Muhammadiyah University of Yogyakarta and Muhammadiyah University of Surakarta in Indonesia;
- 2013: State polytechnics in Malaysia under the Department of Polytechnic Education, Ministry of Education of Malaysia;
- 2014: Selected state universities and colleges in the Philippines under the Philippine Association of Universities and Colleges;
- 2015: State universities in Danang City under the University of Danang (UD) in Vietnam;
- 2015: State universities in Mongolia under the Ministry of Education, Culture and Science;
- 2016: State universities in the Rajamangala University of Technology network;
- 2016: National Institute of Technical Teachers' Training and Research in Chandigarth, India

# COMPARATIVE STUDY: ISSUES AND CHALLENGES

Ref: 2015 11th International CDIO Conference,Chengdu, China

| Issues & Challenges / IHLs | Buy-in | Burden | Mindset | Activities | Assessment | Investment | Lack of confidence | Increase Workload | Packed Curriculum | Training | Content vs CDIO | Skeptism |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SP | ¤ | | ¤ | | | | ¤ | ¤ | ¤ | | | |
| Chula | | | | | | ¤ | | | | ¤ | ¤ | |
| Raja | ¤ | ¤ | | | | ¤ | | | | | | |
| VNU | ¤ | | | | | ¤ | | | | | | ¤ |
| UiTM | | | | ¤ | ¤ | | | | | | | |



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# PARTNERSHIP

- ***Singapore Polytechnic International (SPI)*** provides consultancy services and training programmes to educators, planners, leaders and governmental agencies from all over the world.
- Worked with ASIA IHLs on CDIO programs supported by TEMASEK FOUNDATION International

# OTHER PROGRAMS OFFERED BY SPI

- **Conceive, Design, Implement, Operate (CDIO) Framework for Rethinking Education**

- Design Thinking in Education
- Modular Competency-based Curriculum Design and Development
- Quality Assurance Framework for Managing A Modern Technical Institution
- Singapore's Technical and Vocational Education and Training (TVET) Development

- **Learning Express for Students (LeX Program)**

# LEARNING EXPRESS FOR STUDENTS (LeX PROGRAMME)

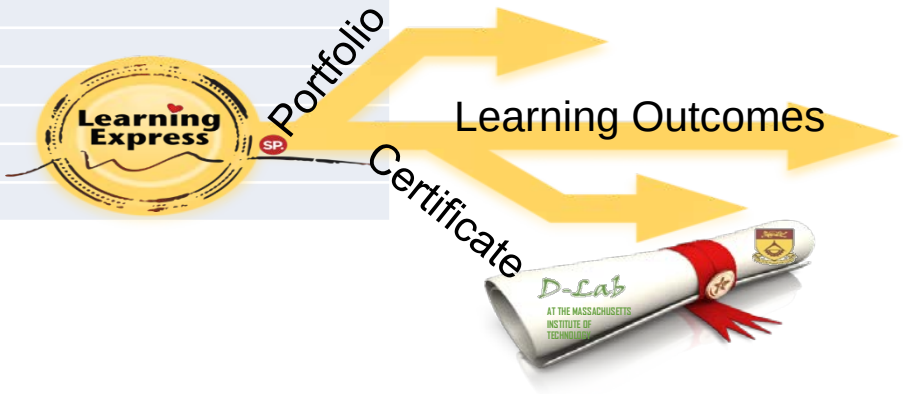
- Is a multi-national, multi-cultural, multi-disciplinary 14 days social innovation programme conducted in a LeX Centre within an ASEAN country.
- Involves students in activities that address local needs while developing their academic skills and commitment to the community.
- Typically a programme site will host 3 groups of each 16~17 students, or total of 50 students (25 SP students + 25 partner's students). The groups are facilitated by 6 facilitators (3 host & 3 SP lecturers) & supported by 1 coordinator




# LEARNING EXPRESS FOR STUDENTS (LeX PROGRAMME)

## Currents Partners:

| Country | Partner institutions |
|---|---|
| Indonesia | Universitas Muhammadiyah Malang (UMM) |
| | Universitas Muhammadiyah Yogyakarta (UMY) |
| | Universitas Pembangunan Nasional Veteran Yogyakarta (UPN) |
| | Politeknik Negeri Ujung Pandang (PNUP) |
| | Universitas Muhammadiyah Makassar (UNISMUH) |
| Thailand | Rajamangala University of Technology Thanyaburi (RMUTT) |
| | Rajamangala University of Technology Lanna (RMUTL) |
| | Chitralada School / Chitralada Technology College (CD) |
| Vietnam | Ho Chi Minh City College of Economics (HCE) |
| | University of Economics Ho Chi Minh City (UEH) |
| | Ho Chi Minh City College Technical Economics College (HOTEC) |
| | Duy Tan University (DTU) |
| | The University of Danang, University of Science and Technology (DUT) |
| | University of Science, Vietnam National University, Ho Chi Minh City (VNU-HCMC) |
| Philippines | Mindanao University of Science and Technology (MUST) |
| | Cebu Normal University (CNU) |
| | Bulacan State University (BSU) |
| | Rizal Technological University (RTU) |
| | Isabela State University (ISU) |
| Myanmar | University of Information Technology (UIT) |
| Malaysia | Polytechnic Kota Kinabalu (PKK) |



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# Thank You

The CDIO Programme is led by Mr Lee Chong Hwa and Dr Linda Lee in consultation with Ms Helene Leong



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