INTENDED LEARNING OUTCOMES: A PROCESS OF FORMULATING INTENDED LEARNING OUTCOMES AT PROGRAM LEVEL

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ABSTRACT

Under the goal of the Fundamental and Comprehensive Reform of Higher Education (HE) in Vietnam 2006-2020 that Vietnam has an advanced HE system achieving international standards by 2020, Ministry of Education and Training (MOET) has introduced a number of initiatives aiming to meet this increased demand for education. The most recent and important change is, for the first time, MOET's mandate (MOET 2009) for development and public declaration of intended learning outcomes (ILOs) of every university department program. However, the existing descriptors (Education Law 2005) for formulation of ILOs are only general statements of educational goals, or the guidelines document (MOET 2010) only instructs that ILOs include knowledge, skills, attitude, and lifelong learning skills.

The CDIO Initiative provides an integrated framework consisting of the CDIO Syllabus and the CDIO Standards to identify ILOs of a program, and to construct a sequence of learning experiences to meet those ILOs. Based on the CDIO Standard 2 and the Syllabus v.2 as a proof of concept, this paper proposes to develop a Process of Formulating ILOs at Program Level (PF-ILOs) for various university department programs to formulate their specific ILOs. In particular, we present: (i) use of CDIO Standard 2 and adaptations of the CDIO Syllabus for formulating ILOs at our strategic university departments; (ii) adaptations of the CDIO Syllabus to diverse education programs; (iii) the Program ILOs Syllabus that has been proposed for Vietnam National University-Ho Chi Minh City (VNU-HCM) based on a generalization of the CDIO Syllabus v.2 and student learning outcomes taxonomies; and (iv) use of the pilot implementation of CDIO as a means to develop the PF-ILOs, which can be replicated at other universities within VNU-HCM and throughout Vietnam.

This paper significantly contributes to the extension of CDIO application to a wide range of disciplines in particular, and promotes the PF-ILOs, which permits university department programs to formulate and improve their ILOs.

KEYWORDS

Learning outcomes, CDIO Syllabus v.2, implementation of CDIO, VNU-HCM

INTRODUCTION

The most recent and important change for higher education institutions (HEIs) in Vietnam is, for the first time, the MOET's mandate (MOET 2009) for formulation and public declaration of ILOs of every university department program. However, the existing descriptors (Education Law 2005) for formulation of ILOs are only general statements of educational goals, or the guidelines document (MOET 2010) only instructs that ILOs include knowledge, skills, attitude, and lifelong learning skills. Therefore, while this mandate has served as a measure to facilitate the curricula reform efforts, it remains a challenge for university department programs to develop their specific ILOs that meet the needs of society and the demand for global integration.

The CDIO Initiative provides an integrated framework consisting of the CDIO Syllabus and the CDIO Standards to identify ILOs of a program, and to construct a sequence of learning experiences to meet those ILOs. Since 2010, VNU-HCM has decided to implement CDIO approach at its strategic university departments to systematically reform their education programs, including the formulation of ILOs and use pilot implementation to develop generalizable solutions that can be exported and replicated at other university departments within VNU-HCM and at other universities throughout Vietnam [1]. In this regards, based on the CDIO Standard 2 and the Syllabus v.2 as a proof of concept, this paper proposes to develop a PF-ILOs for various university department programs to formulate their specific ILOs that meet the above mentioned needs and demand.

The proposed PF-ILOs commands programs to formulate their ILOs based on the Program ILOs Syllabus that has been proposed for VNU-HCM based on a generalization of the CDIO Syllabus v.2 and student learning outcomes taxonomies; and go through a series of overall stages which are: planning; situation analysis conduction; ILOs formulation; and ILOs approval and validation. The stage of ILOs formulation consists of many steps in order to formulate ILOs of 4th level of detail. Working with goals for programs the works that will be presented here involve all stages but the focus will be on the steps of ILOs formulation.

USE OF STANDARD 2 AND ADAPTATIONS OF THE CDIO SYLLABUS AT VNU-HCM: PILOT IMPLEMENTATION

We present the works of formulating program ILOs at our two university departments as below. The pilot implementation involves five education programs: one mechanical engineering program, and four programs in computer science and engineering. The approaches are based on use of all criteria of the CDIO Standard 2 that requires a program set "specific, detailed learning outcomes for personal and interpersonal skills; and product, process, and system building skills consistent with program goals and validated by program stakeholders" [2], and the CDIO Syllabus of 3rd level of detail and 4th level of detail as an open-architectural framework for formulating ILOs for specific programs.

Formulating ILOs for Mechanical Manufacturing Program (Mech Program)

The Department of Mechanical Engineering has decided to adopt the four-section structure of the CDIO Syllabus. The process of formulating program ILOs has consisted of four major steps: survey conduction; data collection and analysis; determination of intended proficiency levels; and expansion of ILOs of 3rd level of detail to the 4th level of detail.

Survey Conduction

Four sub-steps are conducted in order: list topics of the CDIO Syllabus; try surveying in a small group; revise topics; conduct surveys for four groups of program stakeholders. Based

on the CDIO Syllabus [3] and references to several ILOs of related programs in manufacturing engineering [4], [5], primary ILOs of 3rd level of detail (x.x.x) are discussed in detail, including 97 topics that are quite detailed and therefore used for the surveys.
Trial survey was initially implemented for "current proficiency level" and "intended proficiency level" in small groups of junior students and lecturers. However, based on analysis of results, along with comments of the investigators, the Mech Program has carried out questionnaire revisions in which for each topic, stakeholders were asked about its "level of importance". With those revised questionnaires, a mass survey has been conducted for program stakeholders as follows:

- Industry's representatives: enterprise representatives (or enterprises) who hire engineers graduating from the Mech Program.
- Alumni: alumni who graduated from the Mech Program and have had more than two working experience years.
- Undergraduate students: the last year students of or alumni who just graduated from the Mech Program.
- Academic staff: senior lecturers that have had a teaching experience and been responsible for teaching the advanced engineering programs.

Data Collection and Analysis

The number of questionnaires distributed for four stakeholder groups, number of respondents, and valid respondents are illustrated as in Table 1.

Table 1
The mass survey information

Stakeholder Group	Number of distributed questionnaires	Number of respondents	Number of valid respondents
Academic staff (A)	53	43	42
Enterprise (B)	>200	46	43
Alumni (C)	> 200	48	43
Students (D)	124	124	94

Consequently, obtained data were processed by using data analysis techniques. First, average values of "level of importance", "current proficiency level", and "intended proficiency level" were computed for each topic. An example is illustrated as in Table 2.

Table 2
An illustration of mean value for each topic for each group A, B, C, and D

	Level of Importance (1→4)				Current Proficiency Level (0→5)				Intended Proficiency Level (0→5)			
Topic	**A**	**B**	**C**	**D**	**A**	**B**	**C**	**D**	**A**	**B**	**C**	**D**
1.3.1	3.65	3.51	3.37	3.81	2.51	2.29	2.40	2.69	4.05	3.71	3.44	4.12
1.3.2	3.67	3.65	3.37	3.84	2.72	2.40	2.56	2.74	4.16	3.73	3.60	4.06
1.3.3	3.05	3.07	2.93	3.50	2.37	2.15	2.23	2.40	3.60	3.49	3.19	3.83
1.3.4	3.53	3.37	3.23	3.64	2.65	2.46	2.30	2.65	4.02	3.74	3.31	3.94
1.3.5	3.28	3.28	3.07	3.43	2.47	2.31	2.09	2.51	3.67	3.50	3.28	3.75

Next, ANOVA [6] analysis on average values of the "level of importance" of topics among four groups of stakeholders was done. For the first test, testing hypothesis is assumed as "the average values from four survey groups are equal". As in methodology, ANOVA analysis was done for each topic. If an ANOVA table includes any "reject" result, the difference among four partner groups' average values happens and vice versa. As noted, group A, group B, group C, and group D are notations for lecturers, firms, alumni, and students, respectively. It can be

seen that, based on analysis, the level of importance of each topic evaluated by 4 groups are almost different. This ANOVA analysis also leads to the same conclusion when analyzing average values of "current proficiency level" as well as "intended proficiency level".

Determination of Intended Proficiency Level

Based on results obtained from ANOVA, the implementation team has discussed on each topic in more details based on the "level of importance", "current proficiency level", "intended proficiency level", existing conditions, and nature of people involved in order to come up with a suggested ILOs as illustrated in Table 3.

Table 3
The Mech Program: An illustration of ILOs of 3rd level of detail
and intended proficiency levels

3. Interpersonal skills: Teamwork and communication					
3.1.	**(3.5)**	**Teamwork**	3.2.2.	(2.6)	Communications structure
3.1.1.	(3.5)	Forming effective teams	3.2.3.	(3.0)	Written communication
3.1.2.	(3.5)	Team operation	3.2.4.	(3.1)	Electronic/multimedia communication
3.1.3.	(3.0)	Team growth and evolution	3.2.5.	(4.0)	Graphical communication
3.1.4.	(3.0)	Leadership	3.2.6	(3.5)	Oral presentation and inter-personal communications
3.1.5.	(3.1)	Technical teaming	**3.3.**	**(3.5)**	**Communication In foreign languages**
3.2.	**(3.5)**	**Communications**	3.3.1.	(3.5)	English (450 TOEIC)
3.2.1.	(3.0)	Communications strategy	3.3.2.	(3.0)	Other languages

Expansion of ILOs of 3rd to the 4th Level of Detail

In this step, each topic of 3rd level of detail are considered and decided what its performance indicators are. Those are in the 4th level of program ILOs. For example with topics "3.2.4 Electronic/ multimedia communication", contents that can be taught and evaluated in this category are: preparing electronic presentations; the norms associated with the use of e-mail, voice mail, and videoconferencing; and various electronic styles (charts, web, etc). To make these performance indicators measurable, these indicators have to start with an active verb. Therefore, the implementation team then has selected appropriate verbs according to student learning outcomes taxonomies based on the intended proficiency level, and in accordance with Vietnamese culture and language. This step has been done the same for all 97 topics of 3rd level of detail.

Based on the four steps described above, the ILOs of 4th level of detail for the Mech Program have been formulated.

Formulating ILOs for Computer Science and Engineering Programs

The IT Department has decided to split and merge the CDIO Syllabus's skills sections in order to monitor more clearly [7]. They decided to restructure Section 2 and Section 3 into three new sections: "Professional and development skills"; "Environment, enterprise, society and personal responsibilities"; "Teamwork, foreign language skills and personal characteristics". Section 4 has been divided into two new sections: "Conceiving, analyzing, designing and implementing skills" and "Verification, validation, operation, maintenance and evaluation skills". In this regards, "Operating" has been concretized into "Verification, validation, operation, maintenance and evaluation skills". According to the IT Department, its new way of section restructuring is more suitable for the Department's curriculum. Besides, the skills are gathered, and building an IT product is separated from its verification, and operation [7]. The Department's ILOs formulation process is basically the same as of the Department of Mechanical Engineering.

ADAPTATIONS OF THE CDIO SYLLABUS TO DIVERSE PROGRAMS

To propose the Program ILOs Syllabus based on a generalization of the CDIO Syllabus, permitting various university department programs to formulate their specific ILOs, selected works on adaptations of the CDIO Syllabus to diverse programs will be discussed as below.

The Institute of Technology at Linköping University (LiU) has decided that the new programs and course plans, including the formulation of ILOs, shall be based on the CDIO Syllabus. The process hence involves approximately 25 education programs of various types, more than one thousand courses. This process includes some programs in natural sciences (physics, chemistry, biology and mathematics). For these programs the product development and system building context is less appropriate, and for this purpose a modified version of Section 4 has been developed. The product development framework is there replaced with a more research oriented one. To support the formulation of ILOs with the CDIO Syllabus as background a number useful verbs have been organized according to the sections in the CDIO Syllabus and a taxonomy-like structure [8].

At The Vietnam National University, Hanoi (VNU-HN), the CDIO Syllabus was first adapted to the International Economics Program [9]. The adaptation has followed the four-section structure of the CDIO Syllabus. Section 1 has been adapted to “International Economics”; Section 2 and Section 3 remained unchanged; Section 4 has been changed to “Applying knowledge to benefit society”. The most important change is the topic “Operating” has been changed to “Evaluating”. In addition, there was an evidence of the differences between engineering and economics or business disciplines that “applying knowledge to benefit society” need to be placed in “business, societal, and environmental context”.

As the next step to extend the adaptation of CDIO approach, VNU-HN has decided to extend to their new designed programs as well as updated ones [10]. VNU-HN’s document “Guidelines for Curriculum Design Based on The CDIO Approach” instructs ILOs at program level to constitute of 3 Sections: Section 1 Knowledge (is the same as the CDIO Syllabus’s Section 1); Section 2 includes two sub-sections (2.1 Professional skills, 2.2 Soft skills); Section 3 Attitude. It can be seen that VNU-HN basically uses all topics of the CDIO Syllabus of 3rd level of detail, but the Section 2 to Section 4 of the CDIO Syllabus are restructured.

At The Ho Chi Minh City University of Foreign Languages and Information Technology (HUFLIT), the CDIO Syllabus has been adapted to all six education programs [11] in which five programs are beyond engineering education (Foreign Languages, Oriental Studies, International Relations, International Business, and Business Administration). The adaptation approach is the same as for the International Economics Program at VNU-HN. The Section 4 of the CDIO Syllabus has been changed to “Applying knowledge to benefit society” or “Competences for professional practice”. The CDIO skills have been changed to “C, D, I, Improving” education plan, project for the Foreign Languages Program; to “C, D, I, Evaluating” plan, project, policy for the International Relations Program; to “C, Planning, I, O” business for the Business Administration Program, etc.

From the adaptations mentioned above, it is obvious that in almost cases the four-section structure of the CDIO Syllabus remained unchanged. The adaptations of the CDIO Syllabus to programs beyond engineering education have proven the high generality of the CDIO Syllabus at its first version.

THE PROGRAM ILOs SYLLABUS PROPOSED FOR VNU-HCM

The need for a Program ILOs Syllabus for Vietnam universities

In the Vietnam system of HE the overall most important document is the Education Law and the Education Regulations, which specify intended knowledge, skills, and attitude for education programs. While existing ILOs descriptors are only general statements of educational goals, or the guidelines document for formulating ILOs (MOET, 2010) instructs only that ILOs include knowledge, skills, attitude, and lifelong learning skills, to propose a detailed and well-structured Program ILOs Syllabus for various university department programs to formulate their specific ILOs is actually essential.

Generalizing the CDIO Syllabus v.2

To generalize the CDIO Syllabus v.2 into the Program ILOs Syllabus for various programs, we have conducted 3 consecutive generalizations of the CDIO Syllabus of high level of detail, of 2nd level, and of 4th level of detail.

First, we have generalized the CDIO Syllabus of high level into "The Program ILOs Syllabus" of high level by a combined comparison with the Four Pillar of Education, UNESCO (UNESCO, 1996) and the "Knowledge, Skills, Competences--KSC" taxonomy of the European Qualification Framework (EQF) (Tab. 4). The reason to use the EQF's taxonomy was that EQF was designed to have the fewest and simplest possible differentiations. The EQF can be seen as focusing on the most essential and substantial aspects. The interpretation of the EQF descriptors is made simpler because they take account of very similar descriptors in existing qualifications frameworks and because they enable comparability and allocation or relation [12] of ILOs. By this combined comparison we have proved that the four-section structure of the CDIO Syllabus is the most overall structure in sense of educational fields and the most logical structure in sense of ILOs taxonomy.

Table 4
Generalizing the CDIO Syllabus v.2 of high level into the Program ILOs Syllabus

The CDIO Syllabus of high level	**The Four Pillar of Education, UNESCO**	**EQF's ILOs Taxonomy**	**The Program ILOs Syllabus of high level**
1. Disciplinary knowledge and reasoning	Learning to know	Knowledge	1. Disciplinary knowledge and reasoning
2. Personal and professional skills and attributes	Learning to be	Skills	2. Personal and professional skills and attributes
3. Interpersonal skills: teamwork and communication	Learning to live together		3. Interpersonal skills: teamwork and communication
4. Conceiving, Designing, Implementing, and Operating systems in the enterprise, societal and environmental context	Learning to do	Competences	4. Competences for professional practice/ Applying knowledge to benefit society

Second, we have generalized the CDIO Syllabus v.2 of 2nd level of detail into "The Program ILOs Syllabus" for various engineering programs by a comparison with national and international accreditation criteria and qualifications frameworks for engineering programs such as EUR-ACE 2008 [13], 6 criteria/ 19 sub-criteria; ABET EC 2012 [14], 11 sub-criteria; CEAB 2011 [15], 12 criteria; Engineers Australia Policy on Accreditation of Professional Engineering Programs, 2006 [16] (EA 2006), 10 criteria; and Washington Accord, Graduate Attributes and Professional Competencies, 2009 [17] (WA 2009), 12 criteria (Tab 5). It can be seen that the CDIO Syllabus v.2 covers these entire accreditation criteria and qualifications frameworks. By this comparison we have also generalized the CDIO Syllabus v.2 of 4th level of detail into "The Program ILOs Syllabus" for various engineering programs.

Table 5
The CDIO Syllabus v.2 correlated with ILOs of engineering programs
x: strong correlation, (x): good correlation

The Generalized CDIO Syllabus v.2	EUR-ACE 2008	ABET EC 2012	CEAB 2011	EA 2006	WA 2009
1. Disciplinary knowledge and reasoning					
1.1 Knowledge of underlying mathematics and science	1.1	3a	CE1	EA1	WA1
1.2 Core engineering fundamental knowledge	1.2, 5,2	3a	CE1	EA1	WA1
1.3 Advanced engineering fundamental knowledge, methods and tools	1.3, 5.1, 5.3	3k, (3a)	CE5, (CE1)	EA3	WA5 (WA1)
2. Personal and professional skills and attributes					
2.1 Analytical reasoning and problem solving	2.1, 2.2, 2.3 (5.1), (5.2)	3e, (3k)	CE2, (CE11)	EA4	WA2
2.2 Experimentation, investigation and knowledge discovery	4.1, 4.2, 4.3	3b	CE3, (CE7)		WA4, (WA10)
2.3 System thinking	(5.2)	(3c)			
2.4 Attitude, thought and learning	6.5	3i	CE12	EA10	WA12
2.5 Ethics, equity and other responsibilities	6.3	3f, (3k)	CE10, (CE12)	EA9	WA 8
3. Interpersonal skills: teamwork and communication					
3.1 Teamwork	6.1	3d	CE6	EA6	WA9, (WA11)
3.2 Communications	6.2	3g	CE7	EA2	WA10
3.3 Communications in foreign languages					
4. Competences for professional practice/ Applying knowledge to benefit society					
4.1 External, societal and environmental context	5.4, 6.3	3h, 3j, (3c)	CE8, CE9	EA7	WA6, WA7
4.2 Enterprise and business context	6.4	3h, (3c)	CE11		WA11
4.3 Conceiving, systems engineering and management	2.2, 2.3	3c	CE4, (CE9) (CE11)	EA5, (EA8)	WA3, (WA6) (WA11)
4.4 Designing	3.1, 3.2	3c	CE4	EA5, EA8	WA3
4.5 Implementing		(3c)		EA5	
4.6 Operating		(3c)	(CE4)	EA5	(WA3)
4.7 Leading engineering endeavors					
4.8 Engineering entrepreneurship					

And finally, through practices of adaptations of the CDIO Syllabus of 4th level of detail to programs beyond engineering education that we have discussed above including our pilot implementation, we can completely generalize the CDIO Syllabus v.2 into "The Program ILOs Syllabus" meeting our needs.

The Program ILOs Syllabus Proposed for VNU-HCM

The detailed and well-structured Program ILOs Syllabus for various university department programs to formulate their specific ILOs that has been proposed for VNU-HCM to consist of two components: the Generalized CDIO Syllabus v.2; and the Matrix of Student Proficiency Levels (SPL Matrix). The Generalized CDIO Syllabus v.2 (see Tab. 6) includes four sections. Sub-sections 1.1-1.3 have been customized for a discipline. Section 2, section 3, and sub-sections 4.1, 4.2, 4.7, 4.8 remained unchanged. Sub-sections 4.3-4.6 have been concretized for various disciplines [18] - [24] based on related accreditation criteria. The SPL Matrix (Tab. 7) has been designed based on a Bloom's taxonomy of learning domains [25], and student proficiency levels in CDIO Syllabus knowledge and skills [2] so that for each ILOs topic of the

four sections of the CDIO Syllabus of 4th level of detail, the category of related domain is given for use in the formulation of ILOs.

Table 6
The Program ILOs Syllabus proposed for VNU-HCM: An illustration of 2nd level of detail

Programs								
Engineering	**Applied Science**	**Econ./ Business**	**Finance**	**Manage-ment**	**Education**	**Law**	**Medical**	**…**
1. Disciplinary knowledge and reasoning 1.1 Knowledge of underlying mathematics and science 1.2 Core disciplinary fundamental knowledge 1.3 Advanced disciplinary fundamental knowledge, methods and tools **2. Personal and professional skills and attributes** 2.1 Analytical reasoning and problem solving 2.2 Experimentation, investigation and knowledge discovery 2.3 System thinking 2.4 Attitude, thought and learning 2.5 Ethics, equity and other responsibilities **3. Interpersonal skills: teamwork and communication** 3.1 Teamwork 3.2 Communications 3.3 Communications in foreign languages **4. Competences for professional practice/ Applying knowledge to benefit society** 4.1 External, societal and environmental context 4.2 Enterprise and business context								
4.3 Conceiving	Conceiving	Conceiving	Conceiving	Conceiving	Conceiving	Identifying	Performing	…
4.4 Designing	Designing	Designing	Collecting	Designing	Planning	Summari-zing	Selecting and interpreting	…
4.5 Implementing	Implemen-ting	Implemen-ting	Analysing	Organizing	Assessing	Formula-ting	Synthesi-zing and intergrating	…
4.6 Operating	Operating, Verifying	Evaluating	Synthesi-zing	Manage-ment	Improving	Evalua-ting	Developing and implemen-ting	…
4.7 Leadership 4.8 Entrepreneurship								
Common objects of professional practice								
product, process, system	problem, experiment, program, process, system	problem, plan, project, model, procedure	problem or issue, metho-dology, assump-tions, solutions	plan, model, solutions, process	problem, lesson, professional knowledge	issues, opinion, solutions, evaluation, synthesis	Examina-tions, diagnostic investiga-tions, diagnoses, clinical manage-ment plan	...

THE PROCESS OF FORMULATING ILOs AT PROGRAM LEVEL

By using our university departments' pilot implementation, we have developed the PF-ILOs for university department programs to formulate their specific ILOs based on above proposed Program ILOs Syllabus.

Figure 1 shows the process of formulating ILOs at program level. In general, a program ILOs to be formulated must meet requirements including a national/ disciplinary qualifications framework (NQF/ DQF); related professional standards; and accreditation criteria, if desired. It is also in accordance with program's goals and pre-existing conditions. And to have specific and well-structured ILOs, and to meet the needs of society and the demand for global integration, it should base on a certain ILOs framework. In this case it is the

Program ILOs Syllabus that we have proposed above. A program ILOs formulation is initiated by formulating program ILOs of 3rd level of detail. These program primary ILOs will be surveyed, established intended proficiency levels, and approved for the final program ILOs of 3rd level of detail. At the next step, the program ILOs of 3rd level of detail and the established proficiency levels will be developed to ILOs of 4th level of detail. Finally, the program ILOs will be validated to design a new curriculum or update an existing one; to design teaching and learning, and student learning assessment.

Table 7
The SPL Matrix

Student Proficiency Level	The Generalized CDIO Syllabus		
	1.x.x.x	2.x.x.x	2.x.x.x, 3.x.x.x, 4.x.x.x
	Cognitive Domain	Affective Domain	Psychomotor Domain
1. To have experienced or been exposed to	1. Remembering	1. Receiving phenomena	1. Perception 2. Set
2. To be able to participate in and contribute to	2. Understanding 3. Applying	2. Responding to phenomena	3. Guided response 4. Mechanism
3. To be able to understand and explain	4. Analysing	3. Valuing	5. Complex response
4. To be skilled in the practice or implementation of	5. Evaluating	4. Organize values into priorities	6. Adaptation
5. To be able to lead or innovate in	6. Creating	5. Internalizing values	7. Origination

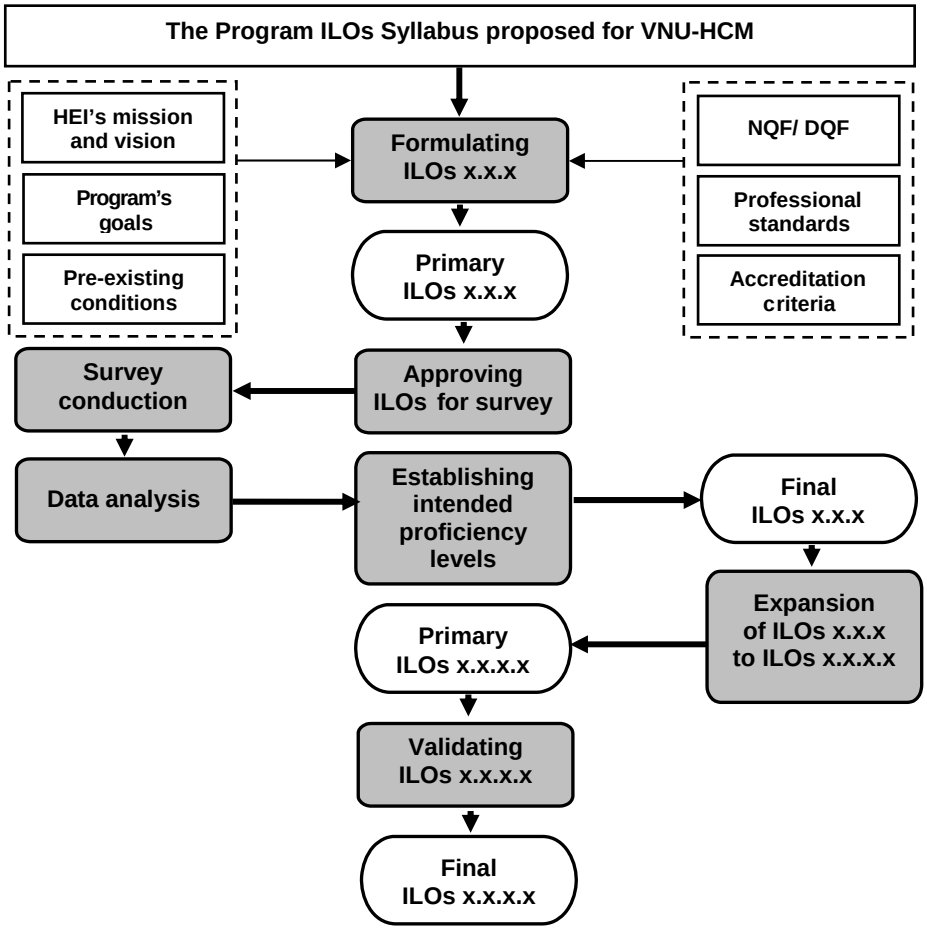

Figure 1: A Process of formulating ILOs at program level

CONCLUSION

Our strategic university departments have used all criteria of the CDIO Standard 2, and have adapted the CDIO Syllabus to derive ILOs that are contemporary and reflective of the knowledge, skills, and attitude needed by programs stakeholders. We have taken an approach to both balance the different views and strive to leverage the comprehensive CDIO Syllabus to derive ILOs that meet highest international standards while still satisfying the specialized requirements of Vietnam.

Through practices of adaptations of the CDIO Syllabus of 4th level of detail to programs beyond engineering education including our university departments' pilot implementation, and our generalizing the CDIO Syllabus v.2, we have proposed the Program ILOs Syllabus for VNU-HCM to consist of two components: the Generalized CDIO Syllabus v.2; and the SPL Matrix, that can be implemented for every education program. Also, we have designed the PF-ILOs permiting university department programs to formulate their specific ILOs that meet the needs of society and the demand for global integration. Both means can be replicated at other universities within the VNU-HCM and throughout Vietnam to meet the MOET's mandate for development and public declaration of ILOs in particular, and to meet the goal of the Fundamental and Comprehensive Reform of HE in Vietnam 2006-2020 in general.

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