土木学会平成 21 年度全国大会 研究討論会 （研 07）

これからの技術者には何が必要ですか？

平成 21 年 9 月 2 日

技術推進機構 継続教育実施委員会

目　　　　　次

研究討論会開催趣旨 座長および話題提供者

話題提供者作成資料（敬称略）

参考資料

土木学会平成 21 年度 全国大会 研究討論会
『これからの技術者には何が必要ですか？』

〔主催〕技術推進機構 継続教育実施委員会

技術者にとって、資格と継続教育（CPD）は車の両輪である。どちらか一方が欠けても技術力の説明責任は果たせない。真に技術力のある技術者になるためには、資格を持ち、その資格を担保する能力を維持し続ける必要がある。土木学会では、継続教育制度を 2001 年４月に発足させ、土木技術者が倫理観と専門的能力を持って社会に貢献できるように、その能力の維持・向上を支援している。近年、我が国においても建設分野で CPD 記録が管理・監理技術者としての要件の一つとされる例が増えている。このような現状を背景に、継続教育と技術者資格のあるべき姿や土木学会が果たすべき役割を討論することを目的としている。

１．座長および話題提供者（敬称略）

座　　　長：　**依田照彦**（早稲田大学）
継続教育実施委員会委員長

話題提供者：　**アラン･バーデン**（ストラクチャード・エンヴァイロンメント代表）
イギリス土木学会（ICE）　在日代表

永田一良（株式会社日立製作所）
日本技術士会 前 CPD 統括小委員会委員長

佐々木寿朗（日本工営株式会社）
継続教育実施委員会幹事長

諏訪博己（前田建設工業株式会社）
継続教育実施委員会委員兼幹事

片山功三（社団法人土木学会）
技術推進機構長

２．開催日時・会場

日 時：　平成 21 年 9 月 2 日（水）16:35～18:35
会 場：　福岡大学 A 棟 402 教室（4 階）

３．ご意見など

本日の研究討論会へのご意見をお願いします。（下記宛にお願いします。）
FAX：03-5379-0125　E-mail：opcet@jsce.or.jp

イギリス土木学会（ＩＣＥ）のＣＰＤ制度について

イギリス土木学会（ＩＣＥ）在日代表
アラン･バーデン

ＩＣＥの内規には「・・・各会員は自分の専門知識と能力を継続的に上達させせなければならない・・・」と記述されています（Rule 5）。義務づけられているが、学会には会員が十分ＣＰＤを実施しているかどうかを監理する制度はない。

ＩＣＥから頂いたＣＰＤガイドライン資料によると：

●内容についてはＩＣＥが指示しない

●実施方法についても定めない（提案が出されている）

●ＣＰＤの量（年に何日間）を定めない

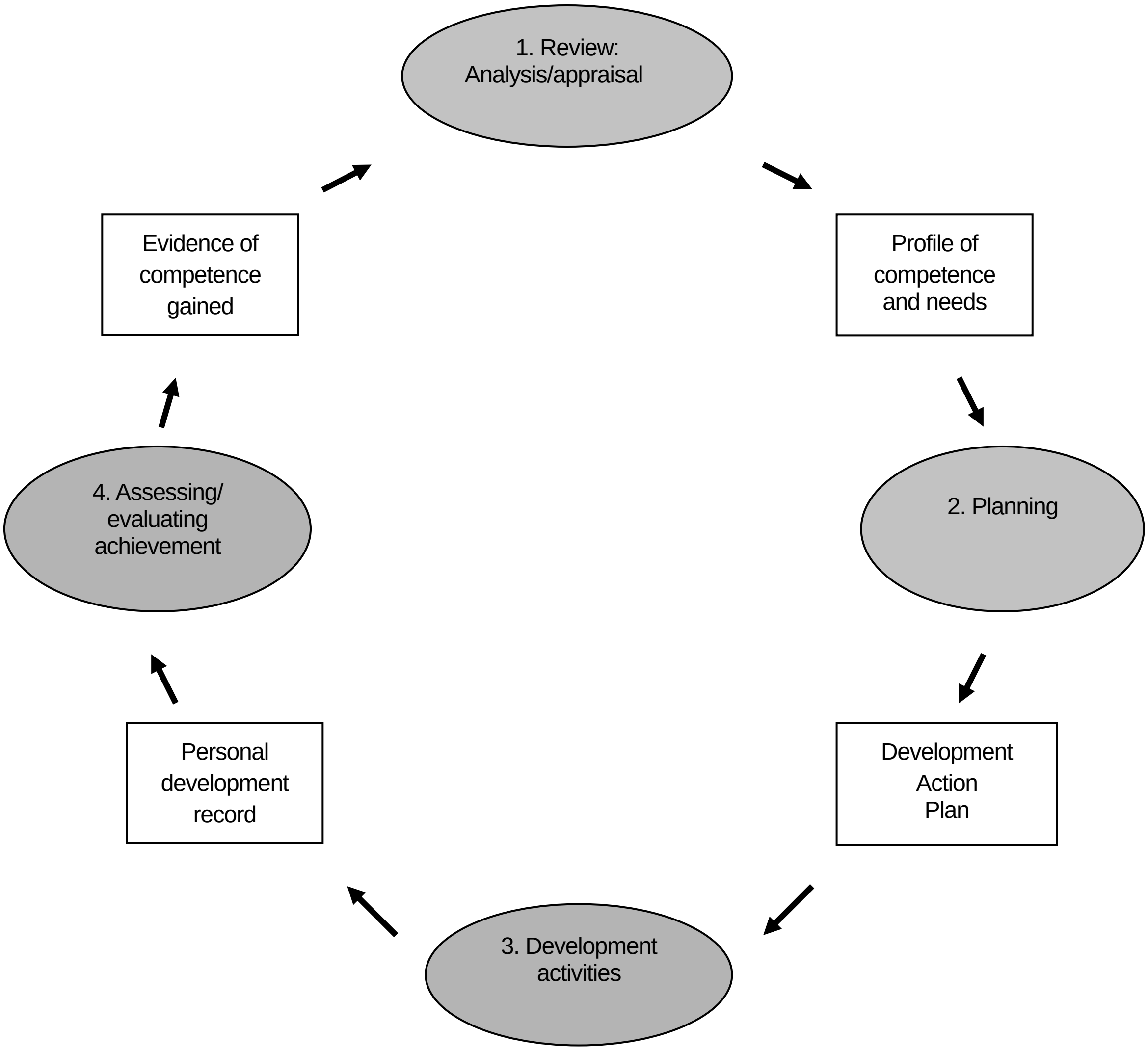
中身や時間より有益さや妥当性を重視する方針になっている。例えば 30 歳の実務中の会員と 70 歳の臨時顧問の仕事をしている会員の必要日数が違うはず。量に関する判断は各自に任せるしかないとの考えである。ＣＰＤの量を日数で測っていいが、それはただコースなどの出席した日数と同じではない。コースに一日出席してもただ寝ているかも知れないし、理解できなかったかも知れないし、内容はすでに分かっていたかも知れない。定義するために６時間の有効なＣＰＤ活動を一日分とする。中身と合計日数を各自の判断で決めていいが、目安として一年間に５日間程度が必要と思われる。

ＣＰＤガイドラインＩＣＥ３００６（後掲、参考資料）には自己計画用ＣＰＤプラン用紙と記録用紙が添付されている。それとＩＣＥウエブサイトには直接保護されたゾーンで計画・記録の入力ができる。いくつかの監理ツールが付いているし、いつでも記録を印刷できるようになっている。
（https://wam.ice.org.uk/wam/default.htm）

ＣＰＤフロー図を参考のため次ページに添付する。

The CPD Cycle as Described in ICE 3006

The currently recommended approach to CPD treats the process as a cyclical experience. This is shown diagrammatically below.



There are many different ways in which your review and plan can be documented. If generally the same information is recorded, you can integrate this documentation with your employer's staff appraisal procedures.

Associated Links

- **Subject areas for development**
- **Types of development activities**

土木学会
平成21年度全国大会
研究討論会資料

1

日本技術士会の継続教育

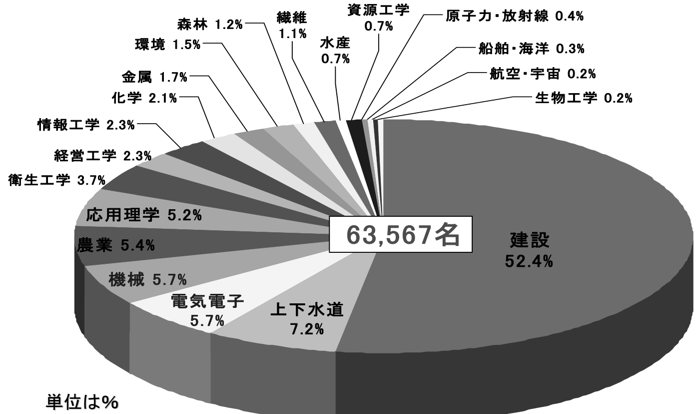
2009.09.02

永 田 一 良

日本技術士会
前CPD統括小委員会委員長
日本工学教育協会 特別教育士

2

技術士の部門別分布



単位は%

総合技術監理部門は10,122名

平成20年12月末現在

3

技術士の義務と責務

義　務　① 信用失墜行為の禁止　　技術士法第44条
　　　　② 秘密保持の義務　　　　技術士法第45条
　　　　③ 名称表示の場合の義務　技術士法第46条

責　務　① 公益確保の責務　　　　技術士法第45条の2
　　　　② 資質向上の責務　　　　技術士法第47条の2

法律で質を保証された最高位の技術者

☆あなたの現在の技術レベルは、
最新最高のものになっていますか？
☆あなたは現在の技術範囲で、
顧客のニーズに応えられますか？
☆あなたは所属組織内のみで、
井の中の蛙になっていませんか？

4

日本技術士会CPD制度の概要

①CPD制度経緯	2001.4 CPDシステムの開発・構築 2002.4 CPD実績の登録開始 2005.4 CPD登録証明書発行開始 2006.3 CPD認定会員制度発足	技術士CPDガイドブック 第5版 2008.4.1～
②CPD対象者	技術士資格所有者	実数 ： 63，567名 重複は除く
③CPD会員数	技術士会会員 ：4，490名 ｝合計 非会員 ：1，455名 ｝5，945名 CPD認定会員 ： 954名	認定会員には 会員証を発行
④システムの特徴	資質の向上に寄与と判断したものを 自己責任で、自己申告する 実施結果を記録し、証を保存する	CPD認定会員対象に 2009.3CPD監査を実施
⑤登録方法	2方法あり ｛WEB登録 文書登録	WEB登録 ：4，876名 文書登録 ：1，069名
⑥相互認証情況	相互連携に関する覚書締結：9学協会 WEB上のHPリンク ： 25学協会	実施細目締結：電気学会

日本技術士会のCPD登録システム

5

目　的	1. 技術者倫理の徹底 2. 科学技術の進歩への関与 3. 社会環境変化への対応 4. 技術者としての判断力の向上
区分と課題項目	A. 一般共通課題:倫理など11項目 B. 技 術 課 題　:最新技術など5項目
形態と重み係数	A. 形　　態 : 受講など10形態 B. 重み係数 : 受講を1(ベース) C. CPD時間 : 実時間*重み係数
登録と記録	A. WEB登録 : ID＆パスワード使用 B. 文書登録 : 年度ごとに纏める
登録証明書	A. 登録された記録に基づき発行
認定会員制度	A. 150CPD時間/3年　以上 課題項目 : 3以上、形態 : 3以上 有効期間 : 3年

何故いまCPDか？＜1＞ －技術者を取巻く技術の世界が変わった－

6

日進月歩の技術革新	ナノ、LSI、バイオ、非金属材料、環境、原子力
日々変化する社会環境	規制緩和、グローバル化、地球規模環境激変
受身の教育、ｺﾝﾋﾟｭｰﾀの弊害	アナログの薦め(経験)/真の学問の薦め(原理原則)
企業・組織の教育の変化	終身雇用制の崩壊、企業編成の激変、OJTの危機
技術倫理教宣のニーズ	理論から実学へ、実学から実践へ、意識対応の研鑽

高い志を持った技術者 ⇒ CPD ⇐ 本人のため、組織のため、社会のため

何故いまCPDか？＜2＞ －社会の求める技術者像が変わった－

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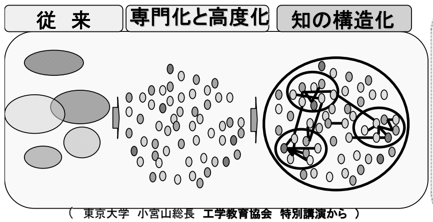
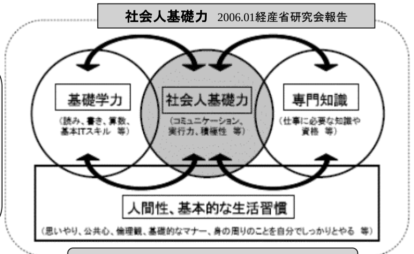


（ 東京大学　小宮山総長　工学教育協会　特別講演から ）



優れた技術者（2003年科学技術・学術審議会報告）

① 基本的な資質として
a)高い職業倫理
b)柔軟で創造性に富む思考力
c)生涯にわたって新しい知識を獲得し，それを統合していく能力

② 技術的な能力として
a)自らの専門領域(複数領域)に関する知識とその応用力
b)技術分野全般を見渡す広い視野や幅広い知識
c)的確な問題設定力・洞察力を持ち，必要とする技術を　組み合わせ統合して問題を解決する能力

③ 経営・管理能力や説明力，コミュニケーション能力等を有し，国際的に運用することが求められる

「社会人基礎力」12の能力要素

前に踏出す力（アクション）	①主体性 ②働きかけ力 ③実行力
考え抜く力（シンキング）	④課題発見力 ⑤計画力 ⑥創造力
チームで働く力（チームワーク）	⑦発信力 ⑧傾聴力 ⑨柔軟性 ⑩状況把握力 ⑪規律性 ⑫ストレス　コントロール

【月刊技術士2009年7月号】

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技術士CPDの監査報告（事業委員会／ＣＰＤ統括小委員会） 抜粋

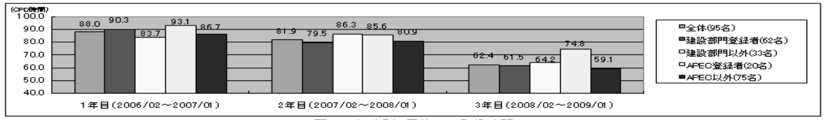


図3.1　年次別、平均CPD登録時間

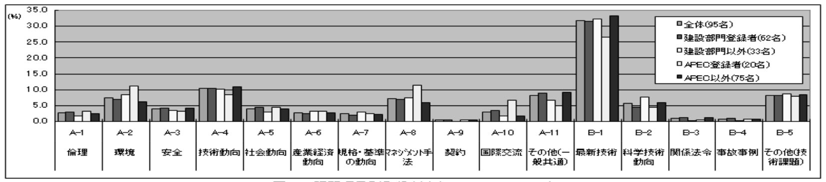


図3.2　課題項目別登録割合(2006.02～2009.01)

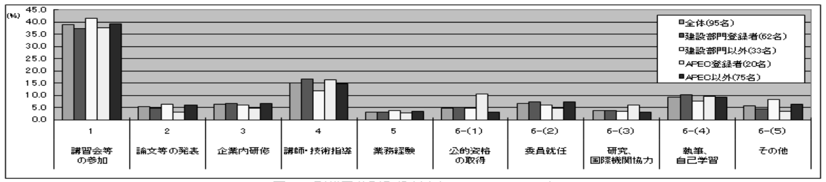


図3.3　形態区分別登録割合(2006.02～2009.01)

CPD推進体制の強化

事業委員会
- 事業計画小委員会
- CPD統括小委員会
- 事業広報/50周年特別
- 事業推進小委員会
- 中小企業交流実行委員会
- 日韓技術士会議実行委員会
- 修習技術者支援実行委員会
- 生涯教育推進実行委員会
- 防災支援実行委員会

《平成21年度》

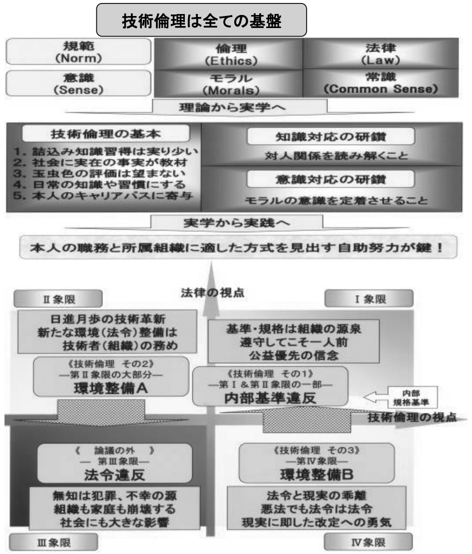
研修委員会
- （仮）第1小委員会
- （仮）第2小委員会
- CPD推進実行委員会
- 青年技術士交流実行委員会
- 修習技術者支援実行委員会

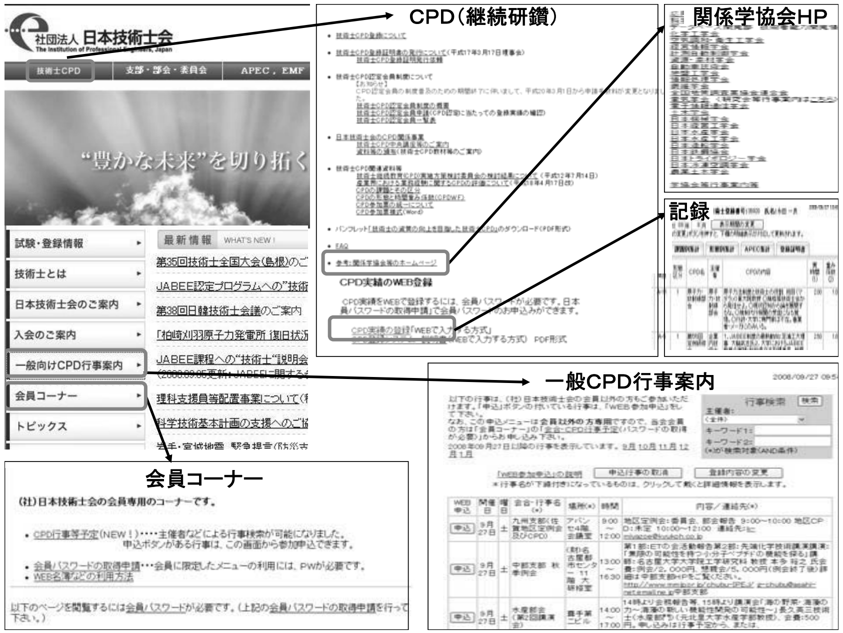
技術士会CPDの方向　—現状維持の技術者には限界—

得意分野分担

中央講座 / 部会CPD / 有機的連携 / 支部CPD / Prj等CPD

具体的推進
1. ① 中央講座の在り方
2. ② 講座情報の共有化
3. ③ 会員連絡網の見直し
4. ④ 講座受講の機会拡大
5. ⑤ CPD活動の費用ガイド
6. ⑥ CPD教宣の活動強化
7. ⑦ CPD理念のビジュアル化
8. ⑧ その他





新しい技術士会CPDを目指して　－ 自分の道は自分の手で －

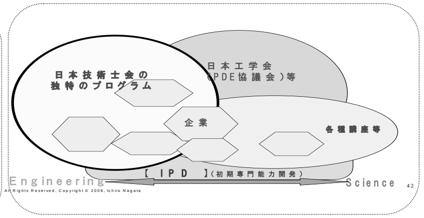
ルーズな連携

得意分野分担

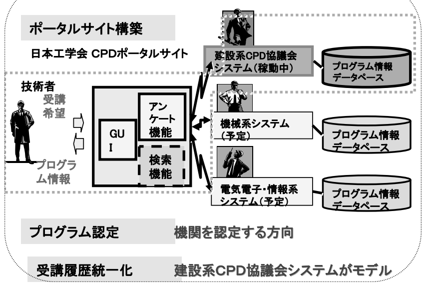
社会へ通用

自己研鑽PDCAのプログラムサポート

何時でも何処でも日々研鑽のフィールド



学協会との連携



みんなで育てる CPDの輪

高く！ 広く!! 大きく!!! 未来へ！

新たなCivil Engineeringに必要な原点回帰

日本工営株式会社
正会員　佐々木　寿朗

はじめに

停滞気味の CPD と技術者資格制度を刷新するには、他律的な対策の視点もあるが、自律的な視点で考えることも重要である。具体には、会員が土木学会の基本精神に立ち返り、ボランティア精神を発揮し、会員を含め遙かに多い会員以外の土木技術者の技術力向上に持てる力を発揮する。このことによって広く社会の発展に寄与するという考え方に立ち戻る原点回帰が重要と考える。

１．土木学会の原点

土木学会は、定款[1)]の第４条で目的を以下のように記している。

「この学会は、土木工学の進歩および土木事業の発達ならびに土木技術者の資質の向上を図り、もって学術文化の進展と社会の発展に寄与することを目的とする。」この目的達成のために、第６条でつぎの事業を行うとしている。その上で、会員資格と会費を定めている。

(1) 土木工学に関する研究発表会、講演会、講習会等の開催および見学視察等の実施
(2) 会誌その他土木工学に関する図書、印刷物の刊行
(3) 土木工学に関する調査、研究ならびに奨励、援助
(4) 土木工学に関する学術、技術の評価
(5) 土木工学に関する啓発および広報活動
(6) 土木工学の発展に資する国際活動
(7) 土木関係情報、図書、その他資料の収集・保管および社会への情報提供
(8) 土木図書館の運営および管理
(9) 土木工学に関する建議ならびに諮問に対する答申
(10) その他目的を達成するために必要なこと。

土木学会員とは、土木工学の進歩や土木事業の発達ならびに会員のみならず広く土木技術者全般の資質の向上を図り、学術文化の進展と社会の発展に寄与することに、賛同しその事業を支える、いわば、ボランティアなのである。一般に、ボランティアも幾通りかある。活動に賛同し寄付をするボランティア。実際の活動を行うボランティア。ボランティア活動を企画・運営・管理する理事クラスのボランティアなど。

地球温暖化や少子高齢化などによって、これから社会が急激に変わる中で、Civil Engineering に求められる新たな使命は決して少なくない。そのような使命を全うするには、土木学会員は、定款が意味するボランティアであることを改めて確認し、その精神に立ち戻る原点回帰が重要である。

言い換えれば、会員は、会費に照らして学会のコストパフォーマンスを考えるのではなく、学会の最終目標であるこれからの社会の発展にどのように会員自らが貢献できるかを主体的に考えるべきではないかということである。数ある Engineering の分野の中にあって、社会そのものを対象とする Civil Engineering であればこそ、この原点回帰の意義は深く、確認することで湧き出る新たな思いもひときわ強いものがあるであろう。

２．停滞気味の CPD と資格制度

土木学会による CPD プログラムの供給量は、図１のとおり、不足している。また、大都市と地方では供給量にも格差がある。図２は、時間や単位を登録する現状の CPD 登録の伸び悩む状況を示す。また、認定資格取得者は必ずしも多くない。

３．原点回帰が突破口

このような課題の突破口は、会員それぞれが土木学会員としての原点に立ち返る原点回帰にあると考える。土木技術者が、Civil Engineering によって社会の発展に貢献するには、言うまでもなく、土木技術者それぞれが優れた技術力を持つ必要がある。会員であることの意義を改めて意識すれば、多くの土木技術者向けに学びやすい教材（プログラム）を広く提供することを主体的に考えられる。また、土木技術者の学習成果を客観的に評価する仕組みの重要性も確信を持って広く土木技術者に説明できるのではないだろうか。

プログラム絶対数の不足

- 年間50単位のうち,10単位のプログラム提供を仮定.
- 個人会員　約3万7千名. 37万単位分のプログラムが必要.
- 1プログラムの受講を50名，単位数を4単位と仮定すると，1プログラム当りの単位数は200単位.
- したがって，1,850プログラムが必要.

⇨　現状の約3倍のプログラム数

図１　CPD プログラムの不足[2)]

「土木技術者の倫理規定」[3)]は「自己の人格、知識、および経験を活用して人材の育成に努め、それらの人々の専門的能力を向上させるための支援を行う。」（第 13 項）としている。そして、第 15 項では「本会の定める倫理規定に従って行動し、土木技術者の社会的評価の向上に不断の努力を重ねる。とくに土木学会会員は、率先してこの規定を遵守する。」としていることも、改めて確認する必要がある。

具体にプログラム作成に取り組めば、当事者にとっての CPD であることも自明である。

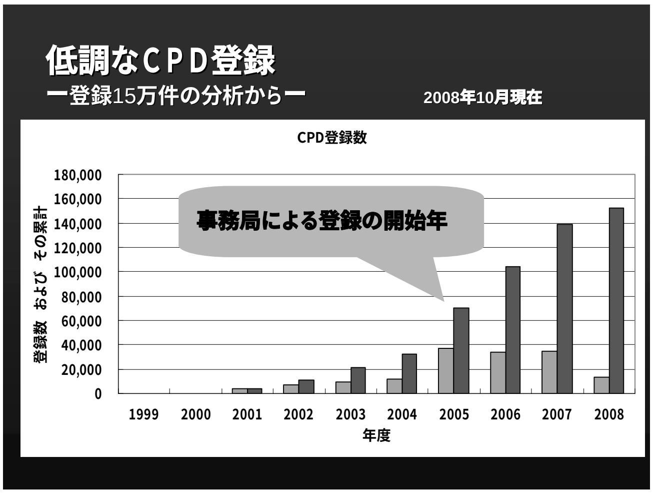


図２　低調な CPD 登録[2)]

このような成果の明確な CPD 実績であれば、自ずと CPD 登録にも意欲が増す。教材作成などの成果を記入することで、時間や単位の記入が副次的なものに思えるからである。

おわりに

この研究討論会の場も貴重な機会であるが、原点回帰の重要性を学会活動の多くの場面で訴え、一層の主体的な取り組みを呼びかけるべきと考える。

参考文献

１）土木学会定款（http://www.jsce.or.jp/rules/files/01-01_teikan.pdf）
２）佐々木寿朗「土木学会の CPD 制度」建設技術者の継続教育を考えるシンポジウム
建設系 CPD 協議会　2008 年 11 月 17 日
３）土木技術者の倫理規定（http://www.jsce.or.jp/rules/rinnri.shtml）

継続教育と技術者資格のあるべき姿（ゼネコンの立場から）

前田建設工業㈱ 土木事業本部
正会員　諏訪 博己

はじめに

社会のニーズの多様化、高度化に対応するために、技術系社員の知識や技術を維持・向上することが必要不可欠になってきており、ゼネコン（総合建設会社）各社においても資格取得の奨励や社内教育・研修を積極的に推進しているところである。このような背景で、建設系の学協会・機関が、各々ＣＰＤ（継続教育）制度を立ち上げ、それぞれのＣＰＤ単位取得を推奨しているが、われわれ、ユーザー側としては、出来るだけ固定された機関で、実務に活用され、役立つプログラムであることが望ましい。

ここでは、ゼネコンの土木技術者が目指す技術者資格、ＣＰＤの登録・活用状況、そして、現状のＣＰＤ制度の問題点と、それを踏まえた土木学会が果たすべき役割について、私見も含めて提言したい。

１．ゼネコンに所属する土木技術者が取得を目指す技術者資格

以下に、取得を目指す資格と、その必要性について記述する。

○1 級土木施工管理技士：土木工事に従事する技術者は、大学を卒業した後、実務経験 3 年で当該資格試験を受験できる。試験に合格し、同時に、監理技術者資格者証を入手することにより、建設業法による公共土木工事における配置技術者（監理技術者）としての要件を満たし、応札が可能となる。従って、ゼネコンの土木技術者においては、入社後、最初に取得を目指す、必須資格である。

○技術士（二次試験）：土木施工管理技士に合格した後に取得を目指す資格としては、実務経歴 7 年で受験資格が与えられる技術士（二次試験）が一般的である。この試験はレベルが高く、高度な専門的な知識を要する資格である。公共土木工事の配置技術者の要件には、1 級土木施工管理技士または技術士、との位置付けで、前者を取得していれば応札可能となる。ただし、設計・調査業務や設計施工一括発注工事の設計照査技術者、ＣＭ（コンストラクション・マネジメント）業務等に、技術者要件として求められている。また、多くのゼネコンがコンサルタント登録をしており、建設部門のみならず他部門の取得、建設部門でもそれぞれの科目の取得を奨励しているのが現状である。

○その他：上記 2 資格の他に、専門分野により、電気工事施工管理技士、建設機械施工技士、造園施工管理技士、また、ダム工事総括管理技術者、コンクリート（主任）技士、同診断士等がある。これらの資格は、特定工種における公共土木工事の配置技術者の資格要件となっている場合もあり、上記資格に次いで資格取得を奨励している。

○土木学会認定技術者資格：まだ、制度としての歴史も浅く、ゼネコンの間でも認知度が低いことは否めない。技術士資格との実質的な差別化がなく、土木工事の応札時における技術者要件にもなっていないので、資格取得のインセンティブが無い。

２．ＣＰＤの登録及び活用状況

建設系ＣＰＤの１４の登録機関のうち、ゼネコンの土木技術者が登録しているのは、全国土木施工管理技士会連合会と土木学会が大半を占め、日本技術士会、農業農村工学会が若干、それ以外の団体はほとんど無いのであろうと推測される。上記 2 団体が多い理由は、会員として登録している人数が多いことと、比較的安価で申請、登録できることにある。登録数が増加している背景は、公共発注機関が技術者評価へのＣＰＤの取込みを拡充してきたことが大きいが、本来の継続教育の目的である自己研鑽という観点から見れば、若干趣旨が異なっている印象も拭いきれない。

３．ＣＰＤ（継続教育）制度に対する問題点

以下に、断片的ではあるが、ユーザー（ゼネコン）側からみたＣＰＤ制度の対する問題点について記述する。

〇団体数が多く、それによって運用に差がありすぎる。また、公共発注機関の入札時の技術者評価において、発注機関により特定の団体のＣＰＤが優遇されるような場合があり、本来の技術者の自己研鑽という観点の継続教育制度から乖離した運用になっている場合が見受けられるため、制度を定めている機関は、継続教育の趣旨を見誤らないようにすべきである。

〇制度を定めている各機関によって、認定する学習プログラムや、推奨する取得ユニット（ポイント）数のバラツキが大きい。また、登録や認定にもコストが掛かる。（原則として、各学会、団体の会員になることが大前提となっている）

〇社内講習や自己学習などの自己研鑽の教育形態は、記録の証明を示すことが困難なものが多い。そのため、認定講習会等の外部教育が認定学習プログラムの主体となる場合が多いことから、コスト負担が大きくなる。

〇各発注機関の入札時の技術者評価において、ＣＰＤ取得に対し、推奨取得ポイント以上としている発注者と、取得の有無（1 ポイント以上）としている発注者があり、評価基準がばらばらである。

〇地方の現場に従事している社員は、外部講習等を受講する機会が少なく、かつ、業務多忙で、社内研修や自己学習への時間的余裕が少ない。

〇自己申告制のため、社内教育や社内会議が CPD に該当するかは個人の判断に任されている。

〇施工現場における OJT は、若手技術者教育、及びその継続教育としても重要な役割を果たす。学習プログラムの一要素として組み込めないか。

〇CPD 登録は義務であるというような啓蒙活動がないと浸透しないのではないか。

４．土木学会が果たすべき継続教育と技術者資格について

以下に、継続教育と技術者資格における土木学会が果たすべき役割について、記述する。

〇土木学会が主導で、建設系ＣＰＤ協議会の各機関の制度のバラツキを、出来るだけ緩和し、ユーザー側のニーズを把握、反映した使いやすい制度に改善していくことが必要である。

（建設系ＣＰＤ協議会すべてのバラツキをなくすことが困難であれば、第一ステップとして少数でも完全相互承認を目指してもよいのではないか）

〇土木学会が認定する、上級技術者等の資格は、更新時に CPD 単位の取得が義務付けられているので、土木学会の技術者資格を技術者にとって重要となる位置づけ（例えば取得を工事入札時の条件する）とすれば、良い循環が生まれると考えられる。

〇土木学会の資格は、二級、一級、上級、特別上級とランク分けされているので、ランクに応じてできることを具体化すれば、資格の意味合いが明確になると思われる。

〇土木学会が主催する講習は、東京を中心とする都市部で行われることが多いため、地方にも目を向けるべきである。

おわりに

以上、ユーザー側からの勝手な意見を述べたが、ＣＰＤの目的は、自主的な自己研鑽、継続教育を行うことの他、技術者としての能力、研鑽、努力を第三者に理解してもらうことにある。今後、土木学会当委員会の一員として、登録機関とユーザーがともに活用しやすい制度に改善すべく活動していきたい。

土木技術者がシステマティックに資質向上に取り組むための支援

(社)土木学会 技術推進機構長
正会員　片山 功三

はじめに

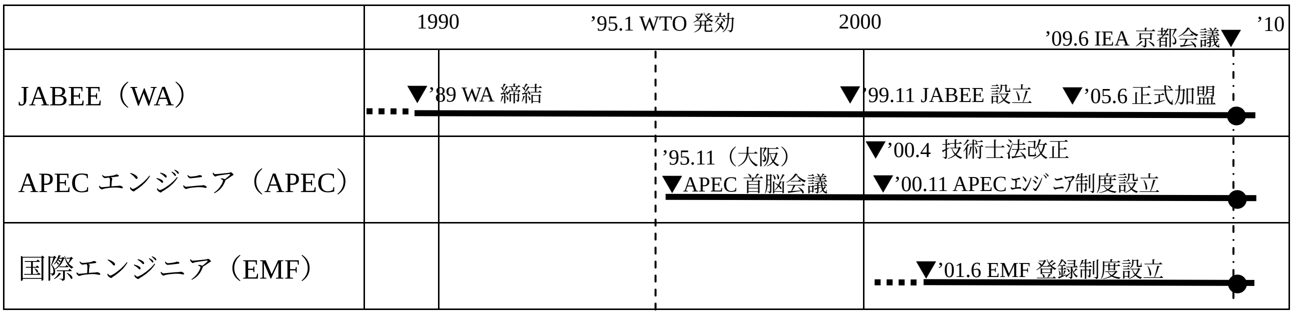
生涯にわたり技術者としての義務を果たし、責任を全うしていくためには、常に最新の知識や技術を修得し、自己の能力の維持・向上を図ることが不可欠である。大学等における基礎教育もさることながら、実社会に出てからの実務を通じた修習や資格取得後の学習が技術者の成長にとって必要であることは言うまでもない。近年の国際化の進展や国内の雇用情勢の変化等により、技術者の継続教育（CPD：Continuing Professional Development）の必要性が広く認識されるようになってきた。

本稿では、土木学会が主体的に取り組んできたことを中心にこの 10 年を振り返り、今後のあるべき姿について言及する。

１．国際化の動きの中で

平成 8（1995）年の WTO 政府調達協定発効を契機に、モノに続いてサービスの貿易自由化が急速に進展し、経済社会のグローバル化に伴い、教育や資格の国際的な同等性をいかに担保するかが課題となった。その後の教育や資格に係る国際化の動きは表１に示すとおりである。本年 6 月には、IEA 注)京都会議が開催され、教育認定や技術者登録の相互認証のためのドキュメント「Graduate Attributes and Professional Competencies」が制定された。この分野での国際的な相互認証の基盤づくりが進んでいる。

表１　教育と資格の国際的同等性確保への動き



注） IEA：International Engineering Alliance。Washington Accord（WA）、Engineers Mobility Forum（EMF）国際登録、Asia-Pacific Economic Cooperation（APEC）エンジニア登録など 6 つの教育と資格に係る協定や制度がその連合体を 2007 年に立ち上げた。

２．ＣＰＤの定義

CPD の定義としては ICE（英国土木学会）のものが知られているが、上述の IEA の定義もほぼ同一である。以下の定義の下線部が相違部分である。「accountable」が追加されており、ICE の定義にある「your working life」は「an engineering practitioner's career」と表現されている。システマティックに個人的資質を高めることが謳われている。

> “the systematic, <u>accountable</u> maintenance, improvement and broadening of knowledge and skills, and the development of personal qualities necessary for the execution of professional and technical duties throughout <u>an engineering practitioner’s career</u>”
> （試訳：エンジニアリングの実務家としての職歴を通じて、専門家として技術的責務を果たすために必要とされる知識やスキルをシステマティックに、説明できる形で、維持、向上、拡大させ、個人的資質を高めること）

３．土木技術者がシステマティックに資質向上に取り組むための支援

(1) 学会内部の支援活動

土木学会では、2001 年度に継続教育（CPD）制度を創設し、教育分野とその内容、教育形態と CPD 単位、CPD 記録の登録方法を制度化した。2005 年度には CPD 記録の登録方法の改善を図り（図 1）、手帳サイズの「継続教育記録簿」から会員証カードと Web を活用したシステムに変更した。CPD 記録の登録が格段に容易になったが、実際は表 2 に示すようにあまり使われていない。

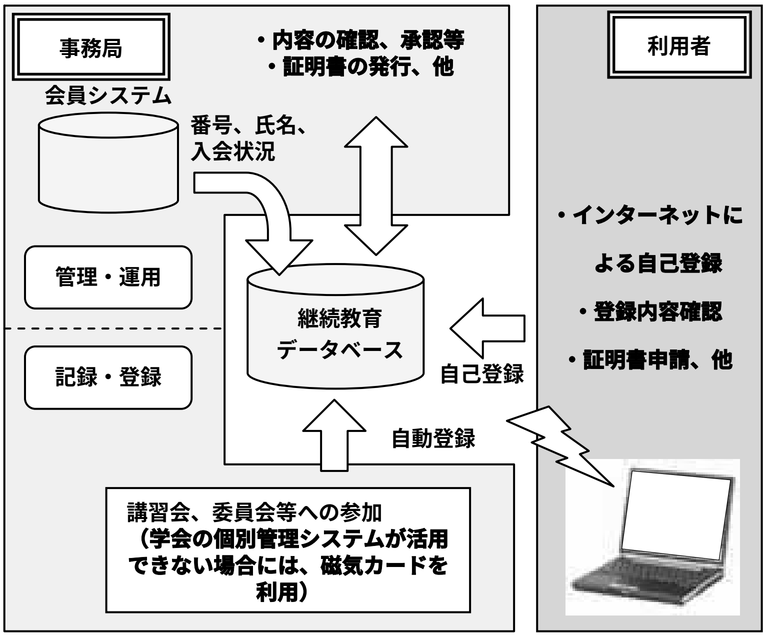


図 1　CPD システムの概要

また、土木学会では認定技術者資格制度（2001 年度創設）における資格認定者の CPD 活動支援も行っている。具体的には、資格レベルに応じた CPD 活動の目的を示すとともに、どういう機会を利用して取り組むことができるかを示した「資格認定者の CPD 課題と達成目標に関するガイドライン」を作成し配布している（表 3）。

表 2　CPD システム利用状況（2009.07.31 時点）

アクセス数	会員		CPD 登録ﾒﾝﾊﾞｰ	合計	構成割合 (%)			
	資格保有者	資格未保有者			資格保有者	資格未保有者	CPD 登録ﾒﾝﾊﾞｰ	全体
0	860	30,385	524	31,769	40.8	91.5	34.8	86.3
1 以上 25 未満	925	2,609	854	4,388	43.9	7.9	56.8	11.9
25 以上 50 未満	187	157	95	439	8.9	0.5	6.3	1.2
50 以上 75 未満	69	36	23	128	3.3	0.1	1.5	0.3
75 以上 100 未満	19	12	6	37	0.9	0	0.4	0.1
100 以上 125 未満	16	7	1	24	0.8	0	0.1	0.1
125 以上	32	3	1	36	1.5	0	0.1	0.1
合計	2,108	33,209	1,504	36,821	100.0	100.0	100.0	100.0

(2)他の学協会との連携

建設系分野に関わる技術者の能力の維持・向上を支援するため、関係学協会間での CPD の推進に係る連絡や調整を図ることを目的に、建設系 CPD 協議会を 2003 年 7 月に創設した。

表 3　資格認定者の CPD 課題と達成目標
(2 級技術者の例)

〔CPDの目的〕大学等で学んだ広範囲な土木工学の基礎をベースとして、1級技術者を目指して、自己の専門技術分野を確立していくとともに、倫理や業務遂行能力など技術者としての基本的素養を涵養する。

基本課題	獲得すべき能力	達成目標	教育分野	教育形態（例）	推奨 CPD 単位
専門技術能力	専門分野における技術知識、応用能力	基礎技術知識を活用して、与えられた業務を自立して遂行できる。さらに、専門技術知識を習得し、経験を積み、1つの専門分野を確立する。	学会のCPD制度の分類で表示		20+ α
業務遂行能力		省略			10+ β
行動原則					5+ γ
【資格更新に必要な単位数:5年間で250単位以上】				合 計	50

多様化した社会において新しい課題に的確に答えていくためには、専門とする技術領域を深めることはもとより、幅広い領域で技術を習得していくことが必要である。建設系 CPD 協議会では、技術者の方々に多くの CPD プログラムの中から自分のニーズに合ったプログラムを適切に選択していただけるよう、「プログラム情報検索・閲覧システム」を開発し、2005 年 4

月から運用している。2009 年 7 月現在、アクセス数は 35 万超回である（図 2）。

また、日本の工学系学会のアンブレラ組織である日本工学会が主宰する CPD 協議会（前身は、2002 年 5 月に発足した「技術者能力開発（PDE）協議会」、同年 11 月に引き継いだ「PDE 協議会委員会」である。）にも参加し、他の学協会と歩調を合わせて CPD 活動の支援策を検討している。

図 2 建設系 CPD 協議会が提供する CPD プログラム情報検索サイト（URL：http://www.cpd-ccesa.org/）

(3) CPD 制度の活用状況

国土交通省地方整備局の総合評価落札方式において「配置予定技術者の能力」評価に CPD の取り組みが考慮（加点評価）されるなど、CPD 活動の実績が利用されている。CPD への関心を高めることに少なからず役立っている。CPD 活動を評価すること自体は良いことであるが、CPD の費用対効果などが云々され、いわゆる手段の目的化の傾向が現れている。先述した CPD の定義に立ち戻って、CPD の本来的な目的に回帰すべきであろう。

４．技術者集団（技術者コミュニティ）の認知度の向上

技術者集団（技術者コミュニティ）に加わることや、資格を取得し CPD に取り組むことは、技術者教育を受け社会人となった技術者が持続可能な社会資本や環境づくりに貢献していくための要件であると考える（図 3）。

技術者コミュニティは技術者が切磋琢磨し自らの能力を高める場であるとともに、そこを通じて社会貢献する場でもあるからである。鶏と卵の議論になるが、技術者コミュニティへの参加者を増やし、技術者ならこうしたコミュニティに参加することは当たり前であるという社会的常識にまで高める努力が学会のみならず一人ひとりの技術者に求められていると考える。

図 3 技術者集団や資格・CPD は技術者としての要件

おわりに

国家間の教育と資格の垣根が急速に失われていく中で、これからの技術者には、プロフェッショナルに相応しい自らの資質や能力の保証と向上のため、資格取得や CPD に取り組むだけでなく、技術者コミュニティを軸に活動し、社会貢献を果たしていくことが必要である。

Institution of Civil Engineers

Continuing Professional Development

Contents

'...it is accordingly of importance that there should be a ready means heretofore of ascertaining persons who by proper training and experience are qualified...'

Extract from Royal Charter

1 Introduction

This guide seeks to update ICE members on current approaches to CPD, and to provide advice and guidance on how best members can make their CPD effective.

2 Recent trends

It is well acknowledged throughout the developed world that individual economies will fail to compete in international marketplaces unless the competence of their workforces is first brought up to world class, and then maintained at this level. In the UK, the development of national education and training policies and strategies over the last 15 or so years has confirmed that 'competence' means not just the acquisition of knowledge, but the effective application of this knowledge in the workplace. Following the influential Latham and Egan reports, continuous improvement in business practice is becoming the goal; this can only be achieved if each employee's competence is continuously improved. One of the benefits of your being an ICE member is that clients and other stakeholders in civil engineering projects can have confidence in your professional obligation to your CPD. Indeed, ICE's Rules of Professional Conduct require that you do this on a continuing basis.

The creation of this more competent workforce is taking place against a background of major changes in business practice. Individuals now seek more variety and mobility of employment since the demise of "corporate loyalty"; but this means that they must also take more personal responsibility for their own learning and development. So ICE members – and those aspiring to be members – need to be increasingly self-aware and imaginative in their approaches to CPD if it is to be effective.

3 Current practice in CPD

The idea of organised, systematic CPD is a comparatively young one, and good CPD practice is still developing. But we have moved on from the initial notion that 'CPD is a good thing', and that we should merely keep a record of the CPD that we do.

The definition of CPD adopted by the construction sector is:
'The systematic maintenance, improvement and broadening of knowledge and skills, and the development of personal qualities necessary for the execution of professional and technical duties throughout your working life.'

Rule 5 of ICE's rules of professional conduct states:
'All members shall develop their professional knowledge, skills and competence on a continuing basis, and shall give all reasonable assistance to further the education, training and CPD of others.'

At the heart of good CPD practice lies the truth that investment in your own learning and development is the most important investment you can make – so it is worth taking time out to make the best of it.

How much CPD should you do? In the past, ICE indicated that five days per year was the requirement, and this is a good guide for those preparing for the Professional Review. But the profession has moved away from time-serving. For those who are qualified ICE members, a more mature answer is: *'Enough to develop and maintain the professional knowledge, skills and competence that you need'.*

4 The CPD Cycle

The currently recommended approach to CPD treats the process as a cyclical experience. This is shown diagrammatically in figure 1.

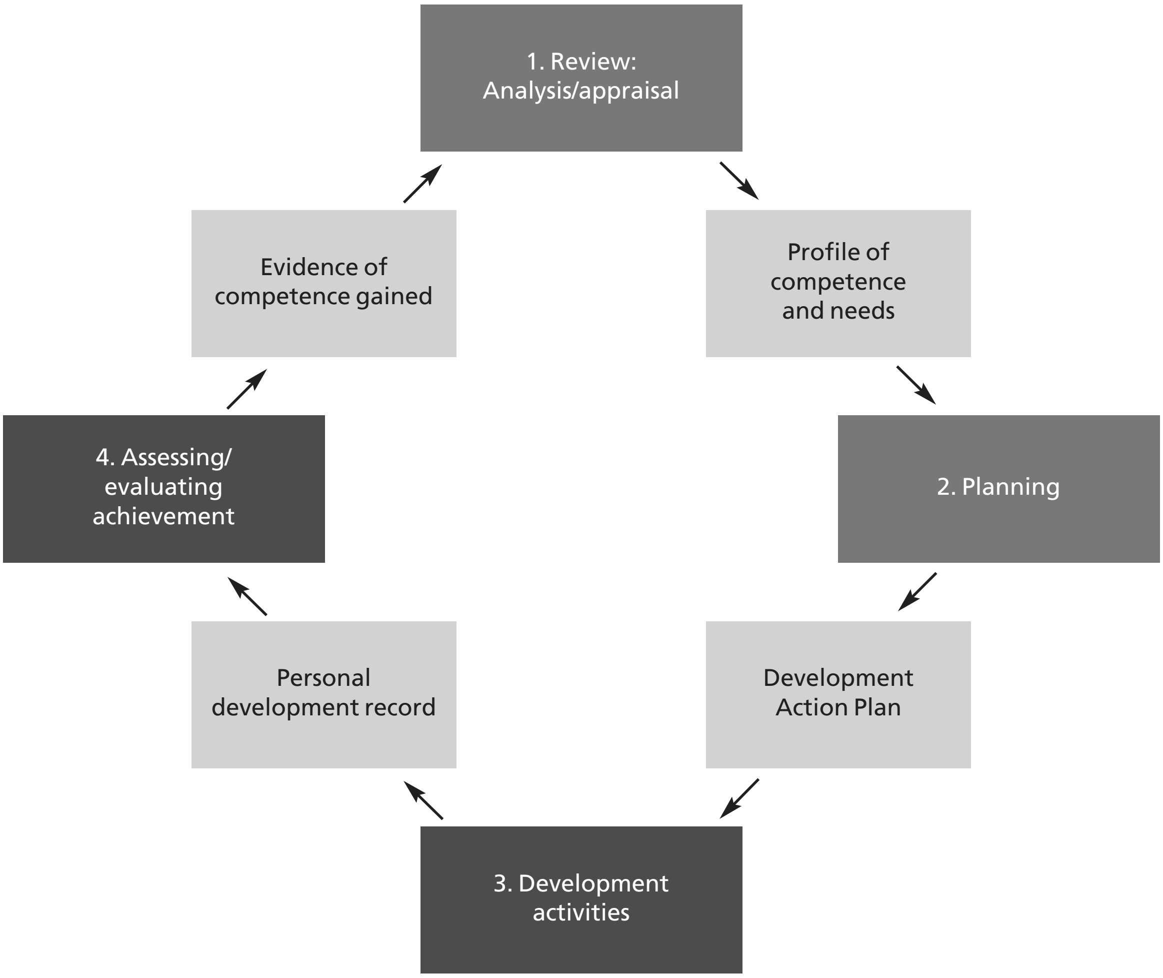


Figure 1 – the CPD cycle.

Development action plan

Personal development record

There are many different ways in which your review and plan can be documented. If generally the same information is recorded, you can integrate this documentation with your employer's staff appraisal procedures.

5 Development Action Plan and Personal Development Record

A suggested format for your development action plan is shown in figure 2 below. You will decide how often this review/plan should take place, but ICE advises that it should be done at least annually.

5.1 Review

First, you should review your recent performance: identify both your current competences and also the areas where you need further learning and development. A SWOT (strengths, weaknesses, opportunities, threats) analysis is a useful tool when undertaking this review. This analysis should take a balanced account of different aspects of your needs. Examples include short-term/long-term development goals and both "hard" (technical) and "soft" (behavioural) components of performance. It is also important to recognise objectives other than your own e.g. what your employer needs, and what ICE, society and the law expects. If you have a periodic staff appraisal this will be an excellent stimulus and framework for this review. Further examples of areas for development are to be found in the appendix.

5.2 Planning

Having prioritised your CPD needs, you should draw up a plan of how these are to be met. This will include consideration of possible activities, necessary resources and appropriate timescales, and should also decide how successful outcomes will be recognised. "Resources" will be wide-ranging, and might include advice from colleagues, secondments/assignments, books and journals, the internet, open/distance learning material, conferences and courses. The cheapest, and often the most effective CPD is on-the-job learning. The key is to recognise this as CPD.

Figure 2. CPD DEVELOPMENT ACTION PLAN Name: John Smith Membership No.: 5555555

Review of learning needs				
Date	Ref	In what area do I need to improve my performance?	How does this link to other objectives (e.g. employer, ICE, etc.)?	What do I need to learn in order to achieve this?
01/02/05	1	Knowledge of NEC	Needed by employer Consistent with ICE activity	Details of NEC
03/02/05	2	Team management skills	Needed by employer	Principles and practice of team management

Development Plan					
Date	Ref	What will I do to achieve this?	What are the likely resources and support that I will need?	How will I evaluate a successful outcome?	What are my deadlines for meeting this target?
01/02/05	1	Attend an introductory course Learn from colleagues Private study	Course fees – discuss with employer Cost of documents – discuss with employer	Knowledge and applicationof NEC in practice	Dec 05
03/02/05	1	Talk to mentor In-house course Study best practice examples	 Book an in-house course – need mentor support Published learning material – see employer	Application of improved team management skills	Dec 05

A blank copy of this form can be found in a Membership Guidance Note available on ICE's website.

5.3 Development activities

The next stage is to put your plan into practice. If you take your personal learning and development seriously, you will find that you experience different sorts of CPD: the activities that you planned and carried out; and the unplanned CPD opportunities that you spotted and exploited. Both types of CPD are valuable and their combination will help you develop habits of curiosity and exploration; good CPD becomes addictive! Further guidance on development activities are to be found in the appendix.

5.4 Evaluation

Once you have carried out your CPD, it is important not only to record it, but also to identify what you have learned and to evaluate the benefits you have gained. This will also be a good test of your CPD plan. Again, your staff appraisal should be helpful in this evaluation, and your employer may have good documentary procedures.

An example of how you might record and evaluate your CPD is shown in figure 3 below.

Figure 3. CPD PERSONAL DEVELOPMENT RECORD   Name: John Smith   Membership No.: 5555555

Development Activity			
Details of CPD activity	Dates	Effective learning time	Development Plan ref.
NEC course	01/08/05	6 hours	1
Team management:			2
Attended in-house course	22/09/05	6 hours	
Complete NVQ unit in "Manage the performance of teams and individuals"	21/11/05 to 25/11/05	30 hours	

Evaluation		
Key Learning Points	Key Benefits/Value added	Further comments: was the plan successful? How can I improve it in future?
Introduction to the philosophy and principles of NEC	Good understanding of NEC principles Good pointers for further study	Need to talk to colleagues, and develop this knowledge in practice
Understanding of the theory and practice of team management	Able to change management/ leadership style depending on the needs of the team Aware of the importance of recognising different individual needs within the team	Good staff appraisal. Ready for more management responsibility Need to feedback to mentor, and develop this competence further

A blank copy of this form can be found in a Membership Guidance Note available on ICE's website.

6 Summary

This completes the first journey round the CPD cycle. By now you will have acquired new learning and development needs, and so the process reiterates itself.

ICE would encourage you to link your **Development Action Plan** to your **Personal Development Record**. It is recommended that each objective for improvement in the Plan should be followed up by what you actually did to achieve that objective in terms of development activities and evaluation within your Personal Development Record.

As your CPD practice matures, you will be aware of the different roles and influences adopted by the key stakeholders in the construction sector. At the centre, ***you*** will set your goals, and motivate and manage your CPD. Your ***employer*** will provide much of the necessary resource, and will help with your planning and evaluation. You will make use of ***education and training*** programmes as necessary. ***ICE*** will provide advice and guidance, and will monitor the CPD activities of its members. ***Construction clients*** will increasingly demand from their contractors evidence of the CPD of their staff. And ***government*** will create the policy frameworks in which all this activity takes place. Figure 4 shows these relationships.

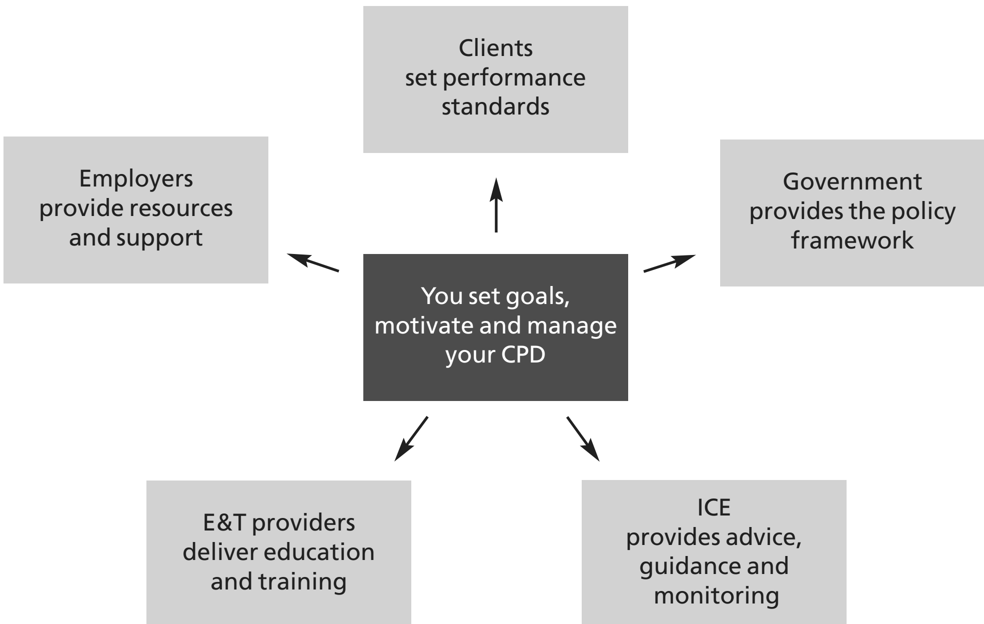


Figure 4 – the key stakeholders in your CPD.

Appendix A

Example Subject Areas for Development

The following list of subjects and topics is provided as an aid to members identifying their development needs. Please note that this list of subjects and topics is not exhaustive and other subjects and topics may be considered to be appropriate by the Institution when justified in development terms.

Self Development

- Interpersonal skills
- Leadership and team management
- Decision making
- Stress management
- Time management and delegation skills
- Career development and planning
- Foreign languages
- Professional ethics and rules of conduct

Communication

- Report and letter writing skills
- Interview skills
- Negotiating skills
- Managing meetings
- Information management
- Presentation skills:
  In house, to clients, at public meetings

Strategic Management

- Establishing practice strategy and developing business plans
- Improving employer's performance – business improvement
- Health and safety legislation, policy and procedures
- Quality assurance and quality management
- Environmental management
- Employee relations and human resource management
- Diversity management – EO & DDA
- Training and development of others

Technical

- Detail design
- Environmental design/technology/impact analysis
- New design skills
- Procurement – estimates, bids and tenders
- Construction site management
- CAD
- Energy efficiency/energy conservation
- New building materials
- New forms of contract and partnering

Legislative

- Construction regulations
- Construction contract law
- Health and safety legislation
- Environmental legislation
- Employment legislation
- Different forms of contract – adversarial, partnering, PFI, DBFO

Associated Professional Areas

- Adjudication
- Architecture
- Arbitration
- Facilities management
- Planning supervision
- Project management

Working With Others

- Team leadership
- Motivation skills
- Negotiation skills
- Delegation skills
- Managing poor performance
- Performance appraisals

Commercial Practice

- Client care and management
- Marketing skills and techniques
- Public relations; dealing with media and VIPs

Information Technology

- Information Technology: in house systems; external computer services; personal computing skills; specialist software

Appendix B

Examples of Suitable Development Activities

The following activities may be recognised by the Institution of Civil Engineers as CPD activities. Please note that this list of activities is not exhaustive and other activities may be considered to be appropriate by the Institution when justified in development terms.

- Learning on the job
- Peer guidance and discussion
- In house presentations
- Attending trade exhibitions and systematically gathering information and knowledge to develop as an engineer
- Structured reading (test your understanding of the reading material)
- Work shadowing to add to your store of knowledge and expertise for routine tasks
- Promoting engineering in primary and secondary schools
- Technical presentations
- Writing reports/writing for publication
- Preparation of CPD presentations to colleagues and other professionals
- Exposure to new situations at work which require action
- Participating in careers conventions
- Job secondment
- Regional ICE events
- Watching training videos and television programmes
- Listening to training audio tapes and viewing CD-Roms for research purposes and technical information
- Participating in Institution activities such as acting as a Reviewer, a Student Liaison Officer or membership of Committees where new initiatives and ideas are discussed
- Sharing knowledge and expertise with others
- Attending allied professions events
- Acting as a coach or mentor for a fellow professional
- Lecturing at organised events
- Research both on the job and for further qualification
- Teaching (for those not in teaching post)
- Self-study through reading textbooks or study packs.
- Personal learning from the internet
- Validated and Accredited qualifications
- Formal distance and open learning courses
- Courses, conferences, seminars and workshops

Contract Management

- Financial planning and management: reporting systems; establishing a budget; cost control systems; cash flow; profit and loss account; balance sheets; VAT and taxation; project finance; EU and government grants
- Procurement procedures
- Site management
- Terms of appointment and contract administration
- Risk management
- Disputes resolution

Specialist Interest Areas

- Energy
- Environment and conservation
- Ground
- Maritime
- Public sector/municipal
- Research and innovation
- Structural and building surveying
- Transport
- Water
- Virtual design
- Urban planning and design
- Education and Training

Acronyms

AMICE
Associate Member of the Institution of Civil Engineers
AQP
Academic Qualifications Panel
AVQ
Advanced Vocational Qualification
BEng
Bachelor of Engineering
CA
Career Appraisal
CAD
Computer Aided Design
CDM
Construction Design Management
CEEQUAL
Civil Engineering Environmental Quality Assessment Scheme
CEng
Chartered Engineer
CEO
Chartered Engineer of other organisations
CPD
Continuing Professional Development
CPR
Chartered Professional Review
DAP
Development Action Plan
DBFO
Design, Build, Finance, Operate
DDA
Disability & Discrimination Act
DE
Delegated Engineer
DO
Development Objective
EC[UK]
Engineering Council of the United Kingdom
Eng Tech
Engineering Technician
EO
Equal Opportunity
GNVQ
General National Vocational Qualifications
HS&W
Health, Safety and Welfare
ICE
Institution of Civil Engineers
IEng
Incorporated Engineer
IPD
Initial Professional Development
IT
Information Technology
JBM
Joint Board of Moderators
MDO
Membership Development Officer
MEA
Mutual Exemption Agreement
MEng
Master of Engineering
MGN
Membership Guidance Note
MICE
Member of the Institution of Civil Engineers
MPR
Member Professional Review
NEC
New Engineering Contract
NVQ
National Vocational Qualification
PDR
Personal Development Record
PFI
Private Finance Initiative
RLO
Regional Liaison Officer
RM
Regional Manager
RST
Regional Support Team
SCE
Supervising Civil Engineer
SE
Supervising Engineer
SVQ
Scottish Vocational Qualification
TMICE
Technician Member of the Institution of Civil Engineers
TPR
Technician Professional Review
TR
Training Review
TRR
Technical Report Route
UK
United Kingdom
VCE
Vocational Certificate of Education

Useful Contacts

Professional Development
020 7665 2200

Professional Reviews
020 7665 2344

Education and Learning
020 7665 2211

Subscriptions
020 7665 2227

ICE Areas
020 7222 7722

Graduates and Students National Committee
020 7665 2006

Library Enquiries
020 7665 2251

Library Loans / Renewals
020 7665 2254

ICE Conferences
020 7665 2311

Thomas Telford Publications
020 7665 2447

Thomas Telford Training
020 7665 2457

Application dates and dates of interviews can be found at ice.org.uk/membership

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International Engineering Alliance

Washington Accord
Sydney Accord
Dublin Accord

Engineers Mobility Forum
Engineering Technologists Mobility Forum

Graduate Attributes and Professional Competencies

Version 2 - 18 June 2009

Executive Summary

Several accrediting bodies for engineering qualifications have developed outcomes-based criteria for evaluating programmes. Similarly, a number of engineering regulatory bodies have developed or are in the process of developing competency-based standards for registration. Educational and professional accords for mutual recognition of qualifications and registration have developed statements of graduate attributes and professional competency profiles. This document presents the background to these developments, their purpose and the methodology and limitations of the statements. After defining general range statements that allow the competencies of the different categories to be distinguished, the paper presents the graduate attributes and professional competency profiles for three professional tracks: engineer, engineering technologist and engineering technician.

1 Introduction

Engineering is an activity that is essential to meeting the needs of people, economic development and the provision of services to society. Engineering involves the purposeful application of mathematical and natural sciences and a body of engineering knowledge, technology and techniques. Engineering seeks to produce solutions whose effects are predicted to the greatest degree possible in often uncertain contexts. While bringing benefits, engineering activity has potential adverse consequences. Engineering therefore must be carried out responsibly and ethically, use available resources efficiently, be economic, safeguard health and safety, be environmentally sound and sustainable and generally manage risks throughout the entire lifecycle of a system.

Typical engineering activity requires several roles including those of the engineer, engineering technologist and engineering technician, recognized as professional registration categories in many jurisdictions[1]. These roles are defined by their distinctive competencies and their level of responsibility to the public. There is a degree of overlap between roles. The distinctive competencies, together with their educational underpinnings, are defined in sections 4 to 6 of this document.

The development of an engineering professional in any of the categories is an ongoing process with important identified stages. The first stage is the attainment of an *accredited educational qualification*, the graduate stage. The fundamental purpose of *engineering education* is to build a knowledge base and attributes to enable the graduate to continue learning and to proceed to formative development that will develop the competencies required for independent practice. The second stage, following after a period of formative development, is *professional registration*. The fundamental

[1] The terminology used in this document uses the term *engineering* as an activity in a broad sense and *engineer* as shorthand for the various types of professional and chartered engineer. It is recognized that *engineers, engineering technologists* and *engineering technicians* may have specific titles or designations and differing legal empowerment or restrictions within individual jurisdictions.

purpose of formative development is to build on the educational base to develop the competencies required for independent practice in which the graduate works with engineering practitioners and progresses from an assisting role to taking more individual and team responsibility until competence can be demonstrated at the level required for registration. Once registered, the practitioner must maintain and expand competence.

For engineers and engineering technologists, a third milestone is to qualify for the *international register* held by the various jurisdictions. In addition, engineers, technologists and technicians are expected to maintain and enhance competency throughout their working lives.

Several international accords provide for recognition of graduates of accredited programmes of each signatory by the remaining signatories. The Washington Accord (WA) provides for mutual recognition of programmes accredited for the engineer track. The Sydney Accord (SA) establishes mutual recognition of accredited qualifications for engineering technologist. The Dublin Accord (DA) provides for mutual recognition of accredited qualifications for engineering technicians. These accords are based on the principle of substantial equivalence rather than exact correspondence of content and outcomes. This document records the signatories' consensus on the attributes of graduates for each accord.

Similarly, the Engineers Mobility Forum (EMF) and the Engineering Technologists Mobility Forum (ETMF) provide mechanisms to support the recognition of a professional registered in one signatory jurisdiction obtaining recognition in another. The signatories have formulated consensus competency profiles for the registration and these are recorded in this document. While no mobility forum currently exists for technicians, competency statements were also formulated for completeness and to facilitate any future development.

Section 2 give the background to the graduate attributes presented in section 5. Section 3 provides background to the professional competency profiles presented in section 6. General range statements are presented in section 4. The graduate attributes are presented in section 5 while the professional competency profiles are defined in section 6. Appendix A defines terms used in this document. Appendix B sketches the origin and development history of the graduate attributes and professional competency profiles.

2 Graduate Attributes

2.1 Purpose of Graduate Attributes

Graduate attributes form a set of individually assessable outcomes that are the components indicative of the graduate's potential to acquire competence to practise at the appropriate level. The graduate attributes are exemplars of the attributes expected of graduate from an accredited programme. Graduate attributes are clear, succinct statements of the expected capability, qualified if necessary by a range indication appropriate to the type of programme.

The graduate attributes are intended to assist Signatories and Provisional Members to develop outcomes-based accreditation criteria for use by their respective jurisdictions. Also, the graduate attributes guide bodies developing their accreditation systems with a view to seeking signatory status.

Graduate attributes are defined for educational qualifications in the engineer, engineering technologist and engineering technician tracks. The graduate attributes serve to identify the distinctive characteristics as well as areas of commonality between the expected outcomes of the different types of programmes.

2.2 Limitation of Graduate Attributes

Each signatory defines the standards for the relevant track (engineer, engineering technologist or engineering technician) against which engineering educational programmes are accredited. Each educational level accord is based on the principle of *substantial equivalence*, that is, programmes are not expected to have identical outcomes and content but rather produce graduates who could enter employment and be fit to undertake a programme of training and experiential learning leading to professional competence and registration. The graduate attributes provide a point of reference for bodies to describe the outcomes of substantially equivalent qualification. The graduate attributes do not, in themselves, constitute an "international standard" for accredited qualifications but provide a widely accepted common reference for bodies to describe the outcomes of substantially equivalent qualifications.

The term graduate does not imply a particular type of qualification but rather the exit level of the qualification, be it a degree or diploma.

2.3 Scope and Organisation of Graduate Attributes

The graduate attributes are organized using twelve headings shown in section 5.2. Each heading identifies the differentiating characteristic that allows the distinctive roles of engineers, technologists and technicians to be distinguished by range information.

For each attribute, statements are formulated for engineer, engineering technologist and engineering technician using a common stem, with ranging information appropriate to each educational track. For example, for the **Knowledge of Engineering Sciences** attribute:

> **Common Stem:** Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization …
>
> > **Engineer Range:** … to the solution of complex engineering problems.
> > **Engineering Technologist Range:** … to defined and applied engineering procedures, processes, systems or methodologies.
> > **Engineering Technician Range:** … to wide practical procedures and practices.

The resulting statements are shown below for this example:

… for Washington Accord Graduate	… for Sydney Accord Graduate	… for Dublin Accord Graduate
Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to defined and applied engineering procedures, processes, systems or methodologies.	Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to wide practical procedures and practices.

The range qualifier in several attribute statements uses the notions of *complex engineering problems*, *broadly-defined engineering problems* and *well-defined engineering problems*. These shorthand level descriptors are defined in section 4.

The attributes are chosen to be universally applicable and reflect acceptable minimum standards and be capable of objective measurement. While all attributes are important, individual attributes are not necessarily of equal weight. Attributes are selected that are expected to be valid for extended periods and changed infrequently only after considerable debate. Attributes may depend on information external to this document, for example generally accepted principles of ethical conduct.

The full set of graduate attribute definitions are given in section 5.

2.4 Contextual Interpretation

The graduate attributes are stated generically and are applicable to all engineering disciplines. In interpreting the statements within a disciplinary context, individual statements may be amplified and given particular emphasis but must not be altered in substance or individual elements ignored.

2.5 Best Practice in Application of Graduate Attributes

The attributes of Accord programmes are defined as a *knowledge profile*, an indicated volume of learning and the attributes against which graduates must be able to perform. The requirements are stated without reference to the design of programmes that would achieve the requirements. Providers therefore have freedom to design programmes with different detailed structure, learning pathways and modes of delivery. Evaluation of individual programmes is the concern of national accreditation systems.

3 Professional Competency Profiles

3.1 Purpose of Professional Competency Profiles

A professionally or occupationally *competent person* has the attributes necessary to perform the activities within the profession or occupation to the standards expected in independent employment or practice. The *professional competency profiles* for each professional category record the elements of competency necessary for competent performance that the professional is expected to be able to demonstrate in a holistic way at the stage of attaining registration.

Professional competence can be described using a set of attributes corresponding largely to the graduate attributes, but with different emphases. For example, at the professional level, the ability to take responsibility in a real-life situation is essential. Unlike the graduate attributes, professional competence is more than a set of attributes that can be demonstrated individually. Rather, competence must be assessed holistically.

3.2 Scope and Organisation of Professional Competency Profiles

The professional competency profiles are written for each of the three categories: engineer, engineering technologist and engineering technician at the point of registration[2]. Each profile consists of thirteen elements. Individual elements are formulated around a differentiating characteristic using a stem and modifier, similarly to the method used for the graduate attributes described in section 2.3.

The stems are common to all three categories and the range modifiers allow distinctions and commonalities between categories to be identified. Like their counterparts in the graduate attributes, the range statements use the notions of complex engineering problems, broadly-defined engineering problems and well-defined engineering problems defined in section 4.1. At the professional level, a classification of engineering activities is used to define ranges and to distinguish between categories. Engineering activities are classified as *complex*, *broadly-defined* or *well-defined*. These shorthand level descriptors are defined in section 4.2.

3.3 Limitations of Professional Competency Profile

As in the case of the graduate attributes, the professional competency profiles are not prescriptive in detail but rather reflect the essential elements that would be present in competency standards.

The professional competency profiles do not specify performance indicators or how the above items should be interpreted in assessing evidence of competence from different areas of practice or for different types of work. Section 3.4 examines contextual interpretation.

[2] Requirements for the EMF and ETMF International Registers call for enhanced competency and responsibility.

Each jurisdiction may define *performance indicators***,** that is actions on the part of the candidate that demonstrate competence. For example, a design competency may be evidenced by the following performances:

> *1: Identify and analyse design/ planning requirement and draw up detailed requirements specification*
> *2: Synthesise a range of potential solutions to problem or approaches to project execution*
> *3: Evaluate the potential approaches against requirements and impacts outside requirements*
> *4: Fully develop design of selected option*
> *5: Produce design documentation for implementation*

3.4 Contextual Interpretation

Demonstration of competence may take place in different areas of practice and different types of work. Competence statements are therefore discipline-independent. Competence statements accommodate different types of work, for example design, research and development and engineering management by using the broad phases in the cycle of engineering activity: problem analysis, synthesis, implementation, operation and evaluation, together the management attributes needed. The competence statements include the personal attributes needed for competent performance irrespective of specific local requirements: communication, ethical practice, judgement, taking responsibility and the protection of society.

The professional competency profiles are stated generically and are applicable to all engineering disciplines. The application of a competency profile may require amplification in different regulatory, disciplinary, occupational or environmental contexts. In interpreting the statements within a particular context, individual statements may be amplified and given particular emphasis but must not be altered in substance or ignored.

3.5 Mobility between Professional Categories

The graduate attributes and professional competency for each of three categories of engineering practitioner define the benchmark route or vertical progression in each category. This document does not address the movement of individuals between categories, a process that usually required additional education, training and experience. The graduate attributes and professional competencies, through their definitions of level of demand, knowledge profile and outcomes to be achieved, allow a person planning such a change to gauge the further learning and experience that will be required. The education and registration requirements of the jurisdiction should be examined for specific requirements.

4 Common Range and Contextual Definitions

4.1 Range of Problem Solving

	Attribute	Complex Problems	Broadly-defined Problems	Well-defined Problems
1	Preamble	Engineering problems which cannot be resolved without in-depth engineering knowledge, much of which is at, or informed by, the forefront of the professional discipline, and have some or all of the following characteristics:	Engineering problems which cannot be pursued without a coherent and detailed knowledge of defined aspects of a professional discipline with a strong emphasis on the application of developed technology, and have the following characteristics	Engineering problems having some or all of the following characteristics:
2	Range of conflicting requirements	Involve wide-ranging or conflicting technical, engineering and other issues	Involve a variety of factors which may impose conflicting constraints	Involve several issues, but with few of these exerting conflicting constraints
3	Depth of analysis required	Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models	Can be solved by application of well-proven analysis techniques	Can be solved in standardised ways
4	Depth of knowledge required	Requires research-based knowledge much of which is at, or informed by, the forefront of the professional discipline and which allows a fundamentals-based, first principles analytical approach	Requires a detailed knowledge of principles and applied procedures and methodologies in defined aspects of a professional discipline with a strong emphasis on the application of developed technology and the attainment of know-how, often within a multidisciplinary engineering environment	Can be resolved using limited theoretical knowledge but normally requires extensive practical knowledge
5	Familiarity of issues	Involve infrequently encountered issues	Belong to families of familiar problems which are solved in well-accepted ways	Are frequently encountered and thus familiar to most practitioners in the practice area
6	Extent of applicable codes	Are outside problems encompassed by standards and codes of practice for professional engineering	May be partially outside those encompassed by standards or codes of practice	Are encompassed by standards and/or documented codes of practice
7	Extent of stakeholder involvement and level of conflicting requirements	Involve diverse groups of stakeholders with widely varying needs	Involve several groups of stakeholders with differing and occasionally conflicting needs	Involve a limited range of stakeholders with differing needs
8	Consequences	Have significant consequences in a range of contexts	Have consequences which are important locally, but may extend more widely	Have consequences which are locally important and not far-reaching
9	Interdependence	Are high level problems including many component parts or sub-problems	Are parts of, or systems within complex engineering problems	Are discrete components of engineering systems

4.2 Range of Engineering Activities

	Attribute	Complex Activities	Broadly-defined Activities	Well-defined Activities
1	Preamble	**Complex activities** means (*engineering)* activities or projects that have some or all of the following characteristics:	**Broadly defined activities** means (*engineering)* activities or projects that have some or all of the following characteristics:	**Well-defined activities** means *(engineering)* activities or projects that have some or all of the following characteristics:
2	Range of resources	Involve the use of diverse resources (and for this purpose resources includes people, money, equipment, materials, information and technologies)	Involve a variety of resources (and for this purposes resources includes people, money, equipment, materials, information and technologies)	Involve a limited range of resources (and for this purpose resources includes people, money, equipment, materials, information and technologies)
3	Level of interactions	Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues,	Require resolution of occasional interactions between technical, engineering and other issues, of which few are conflicting	Require resolution of interactions between limited technical and engineering issues with little or no impact of wider issues
4	Innovation	Involve creative use of engineering principles and research-based knowledge in novel ways.	Involve the use of new materials, techniques or processes in non-standard ways	Involve the use of existing materials techniques, or processes in modified or new ways
5	Consequences to society and the environment	Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation	Have reasonably predictable consequences that are most important locally, but may extend more widely	Have consequences that are locally important and not far-reaching
6	Familiarity	Can extend beyond previous experiences by applying principles-based approaches	Require a knowledge of normal operating procedures and processes	Require a knowledge of practical procedures and practices for widely-applied operations and processes

5 Accord programme profiles

The following tables provides profiles of graduates of three types of tertiary education engineering programmes. See section 4 for definitions of complex engineering problems, broadly-defined engineering problems and well-defined engineering problems.

5.1 Knowledge profile

A Washington Accord programme provides:	**A Sydney Accord programme** provides:	**A Dublin Accord programme** provides:
• A systematic, theory-based understanding of the **natural sciences** applicable to the discipline (e.g. calculus-based physics)	• A systematic, theory-based understanding of the **natural sciences** applicable to the sub-discipline	• A descriptive, formula-based understanding of the **natural sciences** applicable in a sub-discipline
• Conceptually-based **mathematics**, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modelling applicable to the discipline	• Conceptually-based **mathematics**, numerical analysis, statistics and aspects of computer and information science to support analysis and use of models applicable to the sub-discipline	• Procedural **mathematics**, numerical analysis, statistics applicable in a sub-discipline
• A systematic, theory-based formulation of **engineering fundamentals** required in the engineering discipline	• A systematic , theory-based formulation of **engineering fundamentals** required in an accepted sub-discipline	• A coherent procedural formulation of **engineering fundamentals** required in an accepted sub-discipline
• engineering **specialist knowledge** that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.	• engineering **specialist knowledge** that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline	• engineering **specialist knowledge** that provides the body of knowledge for an accepted sub-discipline
• knowledge that supports **engineering design** in a practice area	• knowledge that supports **engineering design** using the technologies of a practice area	• knowledge that supports **engineering design** based on the techniques and procedures of a practice area
• knowledge of **engineering practice** (technology) in the practice areas in the engineering discipline	• knowledge of **engineering technologies** applicable in the sub-discipline	• codified **practical engineering knowledge** in recognised practice area.
• **comprehension of** the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability;	• **comprehension of** the role of technology in society and identified issues in applying engineering technology: ethics and impacts: economic, social, environmental and sustainability	• **knowledge** of issues and approaches in engineering technician practice: ethics, financial, cultural, environmental and sustainability impacts
• Engagement with selected knowledge in the **research literature** of the discipline	• engagement with the **technological literature** of the discipline	
A programme that builds this type of knowledge and develops the attributes listed below is typically achieved in 4 to 5 years of study, depending on the level of students at entry.	A programme that builds this type of knowledge and develops the attributes listed below is typically achieved in 3 to 4 years of study, depending on the level of students at entry.	A programme that builds this type of knowledge and develops the attributes listed below is typically achieved in 2 to 3 years of study, depending on the level of students at entry.

5.2 Graduate Attribute profiles

		Differentiating Characteristic	… for Washington Accord Graduate	… for Sydney Accord Graduate	… for Dublin Accord Graduate
1.	**Engineering Knowledge**	Breadth and depth of education and type of knowledge, both theoretical and practical	Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems	Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to defined and applied engineering procedures, processes, systems or methodologies.	Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to wide practical procedures and practices.
2.	**Problem Analysis**	Complexity of analysis	Identify, formulate, research literature and analyse *complex* engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.	Identify, formulate, research literature and analyse *broadly-defined* engineering problems reaching substantiated conclusions using analytical tools appropriate to their discipline or area of specialisation.	Identify and analyse *well-defined* engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity.
3.	**Design/ development of solutions**	Breadth and uniqueness of engineering problems i.e. the extent to which problems are original and to which solutions have previously been identified or codified	Design solutions for *complex* engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	Design solutions for *broadly- defined* engineering technology problems and *contribute to* the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	Design solutions for *well-defined* technical problems and *assist with* the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4.	**Investigation**	Breadth and depth of investigation and experimentation	Conduct investigations of *complex* problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.	Conduct investigations of *broadly-defined* problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions.	Conduct investigations of *well-defined* problems; locate and search relevant codes and catalogues, conduct standard tests and measurements.
5.	**Modern Tool Usage**	Level of understanding of the appropriateness of the tool	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to *complex* engineering activities, with an understanding of the limitations.	Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to *broadly-defined* engineering activities, with an understanding of the limitations.	Apply appropriate techniques, resources, and modern engineering and IT tools to *well-defined* engineering activities, with an awareness of the limitations.

6.	**The Engineer and Society**	Level of knowledge and responsibility	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.	Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technology practice.	Demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technician practice.
7.	**Environment and Sustainability**	Type of solutions.	Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.	Understand the impact of engineering technology solutions in societal societal and environmental context and demonstrate knowledge of and need for sustainable development.	Understand the impact of engineering technician solutions in societal societal and environmental context and demonstrate knowledge of and need for sustainable development.
8.	**Ethics**	Understanding and level of practice	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.	Understand and commit to professional ethics and responsibilities and norms of engineering technology practice.	Understand and commit to professional ethics and responsibilities and norms of technician practice.
9.	**Individual and Team work**	Role in and diversity of team	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.	Function effectively as an individual, and as a member or leader in diverse technical teams.	Function effectively as an individual, and as a member in diverse technical teams.
10.	**Communication**	Level of communication according to type of activities performed	Communicate effectively on *complex* engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	Communicate effectively on *broadly-defined* engineering activities with the engineering community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions	Communicate effectively on *well-defined* engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions
11.	**Project Management and Finance**	Level of management required for differing types of activity	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member and leader in a team and to manage projects in multidisciplinary environments	Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member and leader in a technical team and to manage projects in multidisciplinary environments
12.	**Life long learning**	Preparation for and depth of continuing learning.	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	Recognize the need for, and have the ability to engage in independent and life-long learning in specialist technologies.	Recognize the need for, and have the ability to engage in independent updating in the context of specialized technical knowledge.

6 Professional Competency Profiles

To meet the minimum standard of competence a person must demonstrate that he/she is able to practice competently in his/her practice area to the standard expected of a reasonable Professional Engineer/Engineering Technologist/Engineering Technician.

The extent to which the person is able to perform each of the following elements in his/her practice area must be taken into account in assessing whether or not he/she meets the overall standard.

		Differentiating Characteristic	**Professional Engineer**	**Engineering Technologist**	**Engineering Technician**
1.	**Comprehend and apply universal knowledge**	Breadth and depth of education and type of knowledge	Comprehend and apply advanced knowledge of the widely-applied principles underpinning good practice	Comprehend and apply the knowledge embodied in widely accepted and applied procedures, processes, systems or methodologies	Comprehend and apply knowledge embodied in standardised practices
2.	**Comprehend and apply local knowledge**	Type of local knowledge	Comprehend and apply advanced knowledge of the widely-applied principles underpinning good practice specific to the jurisdiction in which he/she practices.	Comprehend and apply the knowledge embodied procedures, processes, systems or methodologies that is specific to the jurisdiction in which he/she practices.	Comprehend and apply knowledge embodied in standardised practices specific to the jurisdiction in which he/she practices.
3.	**Problem analysis**	Complexity of analysis	Define, investigate and analyse complex problems	Identify, clarify, and analyse broadly-defined problems	Identify, state and analyse well-defined problems
4.	**Design and development of solutions**	Nature of the problem and uniqueness of the solution	Design or develop solutions to complex problems	Design or develop solutions to broadly-defined problems	Design or develop solutions to well-defined problems
5.	**Evaluation**	Type of activity	Evaluate the outcomes and impacts of complex activities	Evaluate the outcomes and impacts of broadly defined activities	Evaluate the outcomes and impacts of well-defined activities
6.	**Protection of society**	Types of activity and responsibility to public	Recognise the reasonably foreseeable social, cultural and environmental effects of complex activities generally, and have regard to the need for sustainability; recognise that the protection of society is the highest priority	Recognise the reasonably foreseeable social, cultural and environmental effects of broadly-defined activities generally, and have regard to the need for sustainability; take responsibility in all these activities to avoid putting the public at risk.	Recognise the reasonably foreseeable social, cultural and environmental effects of well-defined activities generally, and have regard to the need for sustainability; use engineering technical expertise to prevent dangers to the public.
7.	**Legal and regulatory**	No differentiation in this characteristic	Meet all legal and regulatory requirements and protect public health and safety in the course of his or her activities	Meet all legal and regulatory requirements and protect public health and safety in the course of his or her activities	Meet all legal and regulatory requirements and protect public health and safety in the course of his or her activities

8.	**Ethics**	No differentiation in this characteristic	Conduct his or her activities ethically	Conduct his or her activities ethically	Conduct his or her activities ethically
9.	**Manage engineering activities**	Types of activity	Manage part or all of one or more complex activities	Manage part or all of one or more broadly-defined activities	Manage part or all of one or more well-defined activities
10.	**Communication**	No differentiation in this characteristic	Communicate clearly with others in the course of his or her activities	Communicate clearly with others in the course of his or her activities	Communicate clearly with others in the course of his or her activities
11.	**Lifelong learning**	Preparation for and depth of continuing learning.	Undertake CPD activities sufficient to maintain and extend his or her competence	Undertake CPD activities sufficient to maintain and extend his or her competence	Undertake CPD activities sufficient to maintain and extend his or her competence
12.	**Judgement**	Level of developed knowledge, and ability and judgement in relation to type of activity	Recognize complexity and assess alternatives in light of competing requirements and incomplete knowledge. Exercise sound judgement in the course of his or her complex activities	Choose appropriate technologies to deal with broadly defined problems. Exercise sound judgement in the course of his or her broadly-defined activities	Choose and apply appropriate technical expertise. Exercise sound judgement in the course of his or her well-defined activities
13.	**Responsibility for decisions**	Type of activity for which responsibility is taken	Be responsible for making decisions on part or all of complex activities	Be responsible for making decisions on part or all of one or more broadly defined activities	Be responsible for making decisions on part or all of all of one or more well-defined activities

Appendix A: Definitions of terms

Note: These definitions apply to terms used in this document but also indicate equivalence to terms used in other engineering education standards.

Branch of engineering: a generally-recognised, major subdivision of engineering such as the traditional *disciplines* of Chemical, Civil, or Electrical Engineering, or a cross-disciplinary field of comparable breadth including combinations of engineering fields, for example Mechatronics, and the application of engineering in other fields, for example Bio-Medical Engineering.

Broadly-defined engineering problems: a class of problem with characteristics defined in section 4.1.

Broadly-defined engineering activities: a class of activities with characteristics defined in section 4.2.

Complementary (contextual) knowledge: Disciplines other than engineering, basic and mathematical sciences, that support engineering practice, enable its impacts to be understood and broaden the outlook of the engineering graduate.

Complex engineering problems: a class of problem with characteristics defined in section 4.1.

Complex engineering activities: a class of activities with characteristics defined in section 4.2.

Continuing Professional Development: the systematic, accountable maintenance, improvement and broadening of knowledge and skills, and the development of personal qualities necessary for the execution of professional and technical duties throughout an engineering practitioner's career.

Engineering sciences: include engineering fundamentals that have roots in the mathematical and physical sciences, and where applicable, in other natural sciences, but extend knowledge and develop models and methods in order to lead to applications and solve problems, providing the knowledge base for engineering specializations.

Engineering design knowledge: Knowledge that supports engineering design in a practice area, including codes, standards, processes, empirical information, and knowledge reused from past designs.

Engineering discipline: synonymous with *branch of engineering.*

Engineering fundamentals: a systematic formulation of engineering concepts and principles based on mathematical and basic sciences to support applications.

Engineering problem: is one that exists in any domain that can be solved by the application of engineering knowledge and skills and generic competencies.

Engineering practice: a generally accepted or legally defined area of engineering work or engineering technology.

Engineering speciality or specialization: a generally-recognised practice area or major subdivision within an engineering discipline, for example Structural and Geotechnical Engineering within Civil Engineering; the extension of engineering fundamentals to create theoretical frameworks and bodies of knowledge for engineering practice areas.

Engineering technology: is an established body of knowledge, with associated tools, techniques, materials, components, systems or processes that enable a family of practical applications and that relies for its development and effective application on engineering knowledge and competency.

Formative development: the process that follows the attainment of an accredited education programme that consists of training, experience and expansion of knowledge.

Manage: means planning, organising, leading and controlling in respect of risk, project, change, financial, compliance, quality, ongoing monitoring, control and evaluation.

Mathematical sciences: mathematics, numerical analysis, statistics and aspects of computer science cast in an appropriate mathematical formalism.

Natural sciences: Provide, as applicable in each engineering discipline or practice area, an understanding the physical world including physics, mechanics, chemistry, earth sciences and the biological sciences,

P**ractice area:** *in the educational context:* synonymous with generally-recognised engineering speciality; *at the professional level:* a generally recognised or distinctive area of knowledge and expertise developed by an engineering practitioner by virtue of the path of education, training and experience followed.

Research-based knowledge: a systematic understanding of knowledge and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of the academic discipline, field of study or area of professional practice.

Solution: means an effective proposal for resolving a problem, taking into account all relevant technical, legal, social, cultural, economic and environmental issues and having regard to the need for sustainability.

Subdiscipline: Synonymous with *engineering speciality*.

Substantial equivalence: applied to educational programmes means that two programmes, while not meeting a single set of criteria, are both acceptable as preparing their respective graduates to enter formative development toward registration.

Well-defined engineering problems: a class of problem with characteristics defined in section 4.1.

Well-defined engineering activities: a class of activities with characteristics defined in section 4.2.

Appendix B: History of Graduate Attributes and Professional Competency Profiles

The signatories to the Washington Accord recognized the need to describe the attributes of a graduate of a Washington Accord accredited program. Work was initiated at its June 2001 meeting held at Thornybush, South Africa. At the International Engineering Meetings (IEM) held in June 2003 at Rotorua, New Zealand, the signatories to the Sydney Accord and the Dublin Accord recognized similar needs. The need was recognized to distinguish the attributes of graduates of each type of programme to ensure fitness for their respective purposes.

The Engineers Mobility Forum (EMF) and Engineering Technologist Mobility Forum (ETMF) have created international registers in each jurisdiction with current admission requirements based on registration, experience and responsibility carried. The mobility agreements recognize the future possibility of competency-based assessment for admission to an international register. At the 2003 Rotorua meetings, the mobility fora recognized that many jurisdictions are in the process of developing and adopting competency standards for professional registration. The EMF and the ETMF therefore resolved to define assessable sets of competencies for engineer and technologist. While no comparable mobility agreement exists for technicians, the development of a corresponding set of standards for engineering technicians was felt to be important to have a complete description of the competencies of the engineering team.

A single process was therefore agreed to develop the three sets of graduate attributes and three professional competency profiles. An International Engineering Workshop (IEWS) was held by the three educational accord and the two mobility fora in London in June 2004 to develop statements of Graduate Attributes and International Register Professional Competency Profiles for the Engineer, Engineering Technologist and Engineering Technician categories. The resulting statements were then opened for comment by the signatories. The comments received called for minor changes only.

The Graduate Attributes and Professional Competencies were adopted by the signatories of the five agreements in June 2005 at Hong Kong as version 1.1.

A number of areas of improvement in the Graduate Attributes and Professional Competencies themselves and their potential application were put to the meetings of signatories in Washington DC in June 2007. A working group was set up to address the issues. The IEA workshop held in June 2008 in Singapore considered the proposals of the working group and commissioned the Working Group to make necessary changes with a view to presenting Version 2 of the document for approval by the signatories at their next general meetings. Version 2 was approved at the Kyoto IEA meetings, 15-19 June 2008.

This document is available through the IEA website: http://www.ieagreements.org.

これからの技術者には何が必要ですか？

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