ISO14045 Eco-Efficiency（環境効率）規格の最新動向

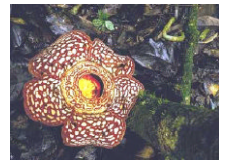
～ ISO/TC207 レオン総会における議論を踏まえて ～

パナソニック株式会社

芝池　成人

ISO14045 Target Dates

- **June 2007** **ISO/TC 207/SC5: Beijing**
- **December 2007** **Task Group Meeting: Gothenburg**
- **January 2009** **1st WG 7 meeting: Kota Kinabalu**



- February 2009 ISO/WD 14045.1
- **June 2009** **2nd WG 7 meeting: Cairo**

- August 2009 ISO/WD 14045.2
- **November 2009** **3rd WG 7 meeting: Stockholm**

- February 2010 Committee draft circulated for 3 months commenting period
- **July 2010** **4th WG 7 meeting: Leon**

today

- December 2010 DIS circulated for 5 months vote
- September 2011 FDIS circulated for 2 months vote
- **December 2011** **ISO 14045 published**

4th Meeting of ISO/TC 207/SC 5/WG 7
Eco-Efficiency Assessment

Date: 11-14 July, 2010

Place: Poliforum Convention Centre, Leon, Mexico

ISO/TC 207
17th Plenary Meeting Schedule

	Meeting	Sunday July 11			Monday July 12		Tuesday July 13			Wednesday July 14			Thursday July 15			Friday July 16			Saturday July 17	
		M	A	E	M	A	M	A	E	M	A	E	M	A	E	M	A	E	M	A
		1	2	3	4	5	6	7	8	9	10		11	12	13	14	15		16	17
Technical Committee	Chair's Advisory Group (CAG)																			
	Small-and Medium Sized Enterprises CAG Task Group																			
	Social Responsibility Task Force																			
	Developing Countries Contact Group																			
	Spanish Translation Task Force																			
	Arabic Translation Task Force																			
	Working Group 7 - Environmental Aspects																			
	Working Group 8 - Material-flow Cost Accounting Workshop																			
	TCG – Terminology Co-ordination Group																			
	Ad hoc Group on Desertification																			
Subcommittees	***SC1 - Environmental management systems***																			
	SC1 TG - JTCG																			
	SC1 SG - Future Challenges of EMS																			
	SC2 - Environmental auditing and related investigations																			
	SC3 - Environmental labelling																			
	SC4 - Environmental performance evaluation																			
	SC4 WG4 - Quantitative Data																			
	SC5 - Life cycle assessment																			
	SC5 WG7 - Eco efficiency																			
	SC7 – Greenhouse gas management and related activities	1a																		
	SC7 WG1 - GHG Competencies		1b																	
	SC7 WG2 - GHG Product Footprinting																			
	SC7 WG2 - Breakout																			
	SC7 WG3 - GHG Organizational Footprinting		1b																	
	Joint SC1-SC7 Ad hoc Group on GHG MRV MSS																			

Reserved for CAG Meeting

OPENING CEREMONY

WORKSHOPS

Reserved for DCCG Meeting

Welcome Cocktail (from 19:30)

Reserved for CAG Meeting

Gala Dinner (from 19:30)

PLENARY MEETING

ISO/TC 207/SC 5/WG 7

Title: **Environmental management — Eco-Efficiency assessment of product systems — Principles, requirements and guidelines**

Convenor: **Bengt Steen, Sweden**
Professor, Chalmers University of Technology

Co-convenor: **Reginald Tan, Singapore**
Associate Professor, National University of Singapore

Secretary: **Sara Ellström, Sweden**
Swedish Standards Institute

Experts: Norway, China, Mexico, Japan, Korea, Sweden, Argentina, Finland, Germany, Singapore, Thailand, Indonesia, Malaysia, Chez, Columbia, Holland, Switzerland, Great Britain, etc.

Voting Result

- 35 votes cast
  - 24 yes
  - 3 no (Brazil, France, UK)
  - 8 abstain
- 12 members not voting
- Criteria to move to DIS
  - consensus, or
  - support from 2/3 of the P-members voting
- 24/27 = 89%

Important Resolutions until Now

- Seeing eco-efficiency assessment as a management tool is important in support of sustainable development.

- The value of product system in this standard can include both historical, functional, emotional, economical and other values.

  The product system value assessment shall consider the full life cycle of the product system, and significant stages may be selected according to the kind of value and stakeholders.

- The concept of 'product system value indicator' is introduced.

  For example, price, LCC, functional performance, etc. can be all indicators to quantify the value in assessment of the 'product system value.'

- Functional value is different from functional unit in this standard.

  Because the functional value of a product can change over time, whereas the functional unit remains.

- 'Comparative assertion' needs precise and clear definition.

  For example, comparison between different generations of the product systems of same function or between product systems of similar functions manufactured by the same manufacturer is not included in 'comparative assertion.'

Introduction of Committee Draft: Principle

- Eco-efficiency assessment is a quantitative management tool which enables the consideration of life cycle environmental impacts of a product system alongside its product system value to a stakeholder.

- Within eco-efficiency assessment, environmental impacts are evaluated using Life Cycle Assessment (LCA) as prescribed by other International Standards (ISO 14040, 14044).

  Consequently, eco-efficiency assessment shares with LCA many important principles such as life cycle perspective, comprehensiveness, functional unit approach, iterative nature, transparency and priority of scientific approach.

- The value of the product system may be chosen to reflect, for example, its resource, production, delivery or use efficiency, or a combination of these.

  The value may be expressed in monetary terms or other value aspects.

Scope

- This International Standard describes the principles, requirements and guidelines for eco-efficiency assessment for product systems including
  - the goal and scope definition of the eco-efficiency assessment,
  - the environmental assessment,
  - the product system value assessment,
  - the quantification of the eco-efficiency,
  - interpretation (including quality assurance),
  - reporting and
  - critical review of the eco-efficiency assessment.
- Requirements and recommendations for specific choices of categories of environmental impact and values are not included.
- The intended application of the eco-efficiency assessment is considered during the goal and scope definition, but the actual use of the results is outside the scope of this International Standard.
- This International Standard is not intended to be used as a single base for contractual or regulatory purposes or registration and certification.

Core Definitions (1)

- **product system**

  collection of unit processes with elementary and product flows, performing one or more defined functions, and which models the life cycle of a product

- **product system value**

  worth or desirability of a product system

  (Note: The product system value may encompass different value aspects, including functional, monetary, aesthetic, etc.)

- **product system value indicator**

  numerical quantity representing the product system value

  (Note: To express the product system value indicator, various kinds of units such as physical and monetary units or relative gradings and scoring may be used.)

Core Definitions (2)

- **eco-efficiency**

  aspect of sustainability relating the environmental performance of a product system to its product system value

- **eco-efficiency indicator**

  measure of the environmental performance of a product system and its related product system value

- **comparative assertion**

  claim in eco-efficiency regarding the superiority or equivalence of one product versus a competing product in a market that performs the same function

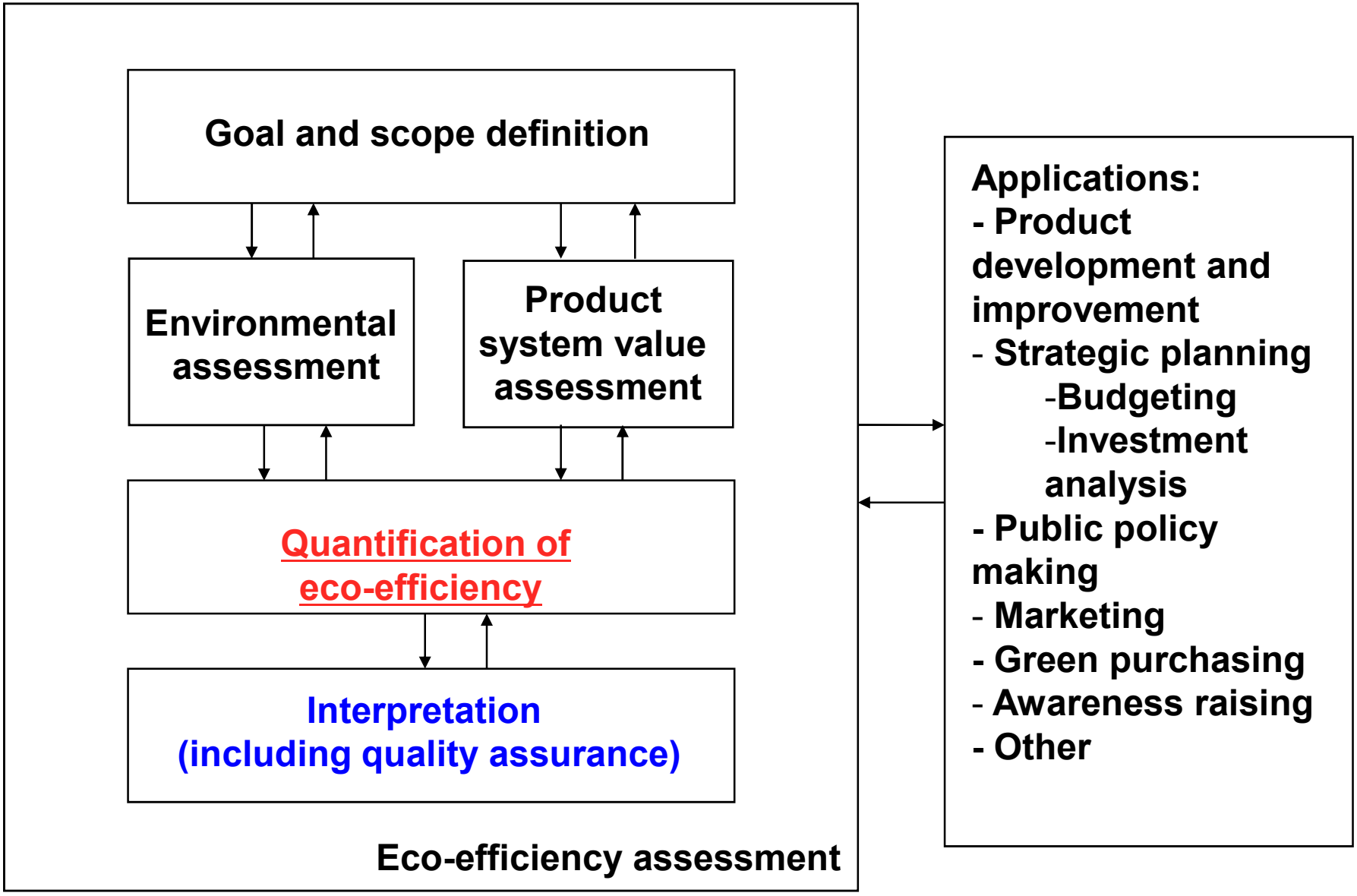
  (Note: Comparison between different generations of the product systems of same function or between product systems of similar functions manufactured by the same manufacturer is not included in comparative assertion.)

Principles of Eco-efficiency

The following principles are fundamental and serve as guidance for decisions relating to both the planning and the conducting of an eco-efficiency assessment.

- **Life cycle perspective**
- **Iterrative approach**
- **Transparency**
- **Comprehensiveness**
- **Priority of scientific approach**

Phases of Eco-Efficiency Assessment



Key Features of Eco-efficiency Assessment

- An eco-efficiency assessment is an assessment of environmental performance of a product system in relation to its value.

- Eco-efficiency is a practical tool for managing environmental and value aspects in parallel.

- The result of the eco-efficiency assessment relates to the product system, not the product per se.

A product cannot be eco-efficient, only its product system which includes the production, use, disposal, i.e. the full life cycle.

- Different stakeholders may encounter different values for the same product system.

For instance, the product system value to the consumer may be different from the product system value to the producer, and in turn different to the investor.

Function and Functional Unit

- The scope of an eco-efficiency assessment shall clearly specify the functions (performance characteristics) of the product system being studied.

  A functional unit shall be defined consistent with the goal and scope of the eco-efficiency assessment.

- One of the primary purposes of a functional unit is to provide a reference for the environmental assessment.

  It may also be useful for the product system value assessment, either as a reference for normalization or as a product system value measure in itself.

  Therefore the functional unit shall be measurable and clearly defined.

Product System Value Assessment

- The product system value assessment shall consider the full life cycle of the product system.
- There are many ways to assess the product system value, as the product system may encompass different value aspects, including functional, monetary, aesthetic, etc.
- In economy, values created by businesses are equal to profit, that is incomes minus costs.

  For customers, it may be the willingness to pay minus costs for the customer, often called surplus value.

  The costs may include price, rental fee, operating charge, etc.

  Such values are difficult to determine on a life cycle basis, because some actors in the supply chain are unwilling to communicate their costs and profits.

  However, one may estimate changes in such values, either through functional performance (functional value) or through financial costs (monetary value).

Functional Value

- Functional value of a product system reflects a tangible and measurable benefit to the user and other stakeholders.

  The functional value is a numerical quantity representing functional performance or desirability of a product system, and should be maximized.

- In the eco-efficiency assessment, the functional value is different from the functional unit.

  The functional value may be related to the functional unit in a quantification of the product system performance.

  The functional unit provides a reference to which the input and output data are normalized (in a mathematical sense).

  Therefore the functional value may change over time, whereas the functional unit remains.

  NOTE The functional values may be measured with reference to the functional unit. A physical unit to quantify the functional performance of the product system as an indicator should be related to the functional unit or its scientific and engineering attributes or properties.

Monetary and Other Values

- **Monetary value may be expressed in terms of costs, price, willingness to pay, added value, profit, future investment, etc.**
- **Changes in costs for a single company may represent changes in the product system value over the entire life cycle.**

  This would not apply if other parts of the product system are affected, for example if the price from suppliers is negotiated to be lower or the price to the customer is raised for the same products.

- **Other values may include intangible values such as aesthetic, brand, cultural and historical values.**

  These values may be determined by means of interviews, surveys, market research, etc.

Comparison of Eco-Efficiency Assessment Results

- When comparison of eco-efficiency results between product systems or within the same product system are made, it shall be based on the same eco-efficiency indicator.

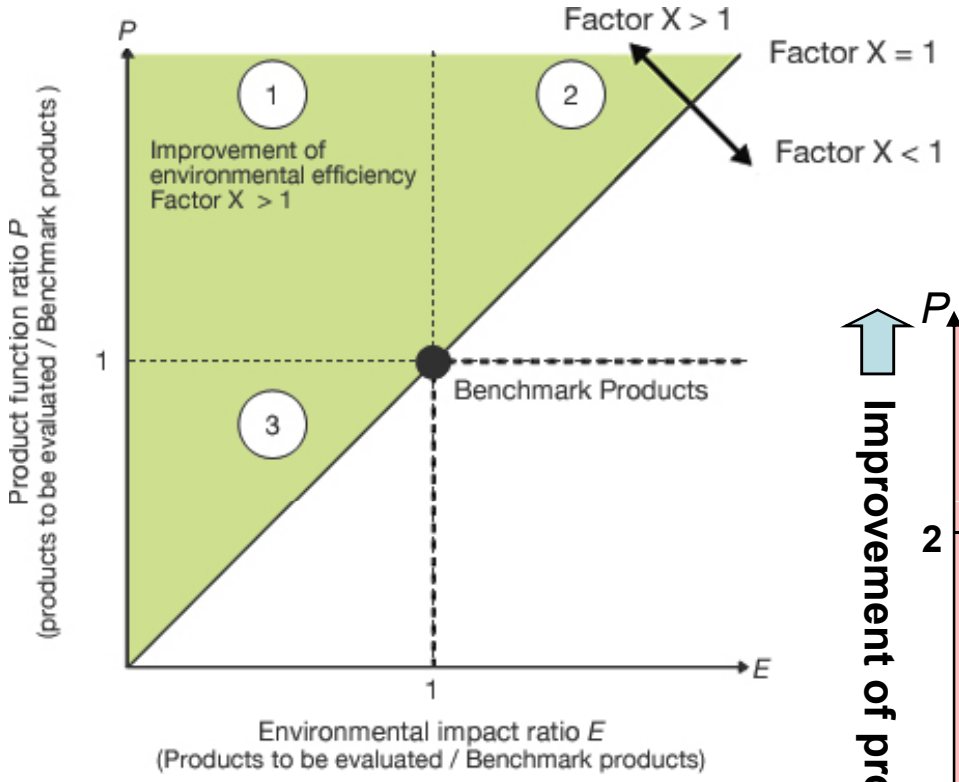
  The comparative environmental assessment results and the product system value assessment results shall then be separately included in the eco-efficiency assessment report.

- The second case (improvement or superiority in just one of both aspects) is the most challenging, because of the trade-off between environmental and product system value aspects.

  In this case, an improvement or superiority of eco-efficiency shall only be reported, if the trade-off is clearly communicated and the underlying product system value assumptions are documented and justified.

- If a claim of improvement or superiority of eco-efficiency is disclosed to third parties for the purpose of comparative assertions, the eco-efficiency assessment results shall demonstrate an equal or better environmental performance.

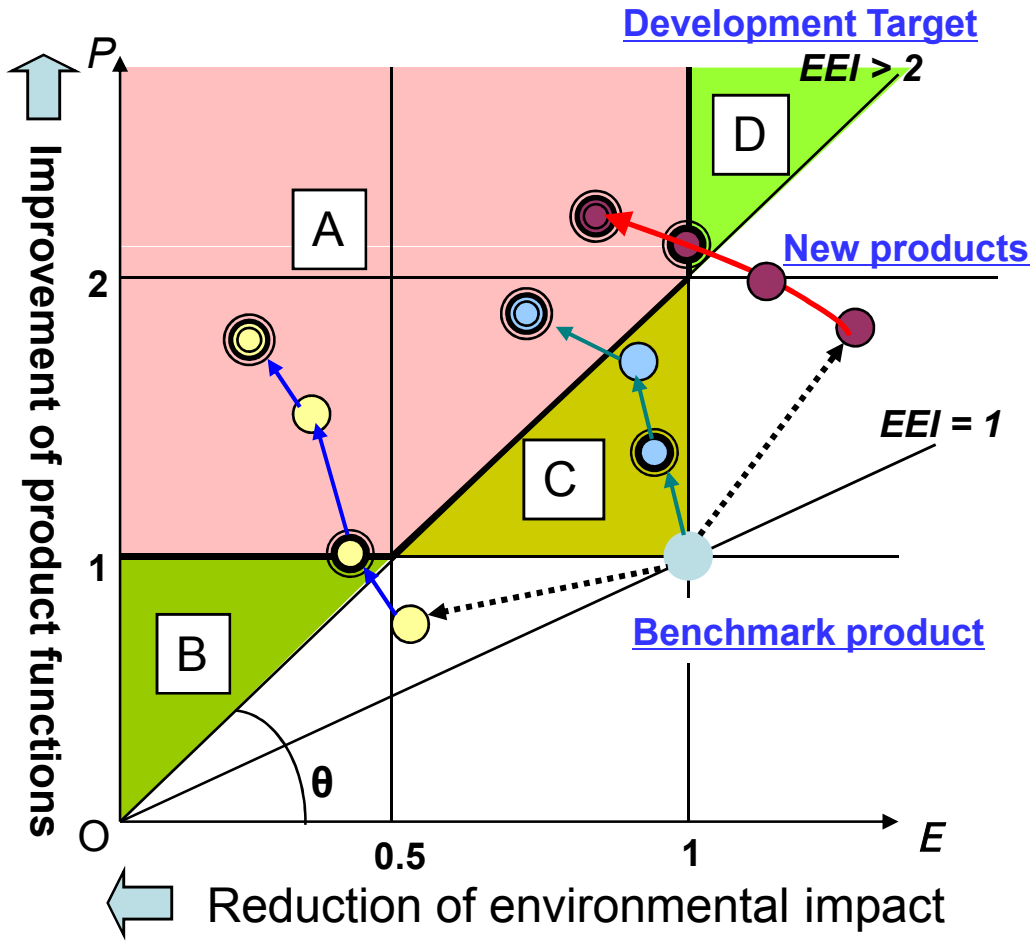
Product Development Paths



① **Both product function and environmental impact improve**
② **Product function improves but environmental impact increases**
③ **Environmental impact improves but product function declines**

EEI (Eco-Efficiency Indicator) = P/E

A: Target area in best conditions
B: Semi-target area toward G
C: Semi-target area in better conditions
D: Non-target area



Reporting and Disclosure of Results

- The results and conclusions of the eco-efficiency assessment shall be completely and accurately reported without bias to the intended audience.

  The results, data, methods, assumptions and limitations shall be transparent and presented in sufficient detail to allow the reader to comprehend the complexities and trade-offs inherent in the eco-efficiency assessment.

  The report shall also allow the results and interpretation to be used in a manner consistent with the goals of the eco-efficiency assessment.

- The results of the environmental assessment and product system value assessment shall be documented separately.

Further reporting requirements for comparative assertion intended to be disclosed to the public

If results from an eco-efficiency assessment are intended to be used in comparative assertions disclosed to the public, neither the environmental nor the eco-efficiency assessment results shall be reported as a single overall score or number.

Annex A: Examples of Values and Indicators

Table A.1 – Light source life cycle example

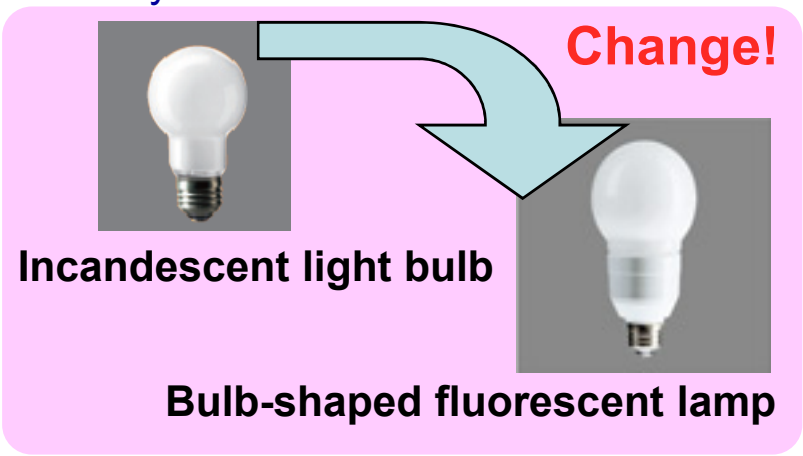
Terms	Example	Value indicator (unit)
Product system	Light source life cycle	
Function	Illumination	
Functional value	Brightness	Luminous flux (Lumen)
Monetary value	Market price	Price (Euro/piece)
Other values	Shape	Consumer ranking (numerical value from 1-5)

Table A.2 – Mobile phone example

Terms	Example	Value indicator (unit)
Product system	Mobile Phone	
Function	To use the product for a long time	
Functional value	Durability	Warranty lifetime (Years)
Monetary value	Depreciation	Trade-in value (USD)
Other values	Aesthetics	Colour preference (no unit)

Annex B: Examples of Eco-Efficiency Assessment

- 4 real examples using the same structure and meeting the requirements of the draft standard.
  - **Goal definition:**
    - Purpose of the eco-efficiency assessment
    - Intended audience
    - Intended use of the results
  - **Scope definition**
    - Product system to be assessed: name, scale of production, location of life cycle stages, time of production and use, main stakeholders involved
    - Function and functional unit
    - System boundary
    - Allocations to external systems
    - Environmental assessment method and types of impacts
    - Value assessment method and type of products system value
    - Choice of eco-efficiency indicator(s)
    - Interpretation to be used
    - Limitations
    - Reporting and disclosure of results
  - **Environmental assessment**
  - **Product system value assessment**
  - **Quantification of eco-efficiency**
  - **Interpretation**



Main Outcomes from Leon (1)

- CD1への各国コメント（118項目）の処理。**value assessment** の方式改善、定義等の加筆訂正、修文、事例精査、等を行った。

- 仏、英より「価値評価はTC207の範疇外だからTRに」という意見があったが、
  - 評価にあたってはライフサイクルを考慮し、重要なステージを選択する
  - **intangible** な価値においても定量化手法を例示する
  - **Annex B** において、より事例を充実させて理解を促進させる

  という共通の理解が得られた結果、評価方法の記述が厳密且つ一般的な内容に改善されたと判断され、DIS段階に進んでも良いとの結論に達した。

Main Outcomes from Leon (2)

- **Functional unit** の考え方を単位機能、単位時間当たり（の環境負荷、価値）と決定した。すなわち、ランプの評価例で新技術を搭載した製品の寿命伸長によりトータルのCO2排出量が増加してしまうような場合においても、適切な **Functional unit** の設定により環境負荷についても改善されたという評価が可能になった。結果、（比較主張の制約に関わらず） **eco-efficiency** についても改善されたとの評価が可能になった。

- 価値はステークホルダーによって異なるという見解は維持された。したがって上にもあるように、価値評価は製品･サービスのライフサイクルを考慮するが、価値の生ずるステージはステークホルダーにより異なり且つ限定される場合がある、という共通理解が再認識された。

Main Outcomes from Leon (3)

- 日本の第一事例以外の3事例は **Weighting** 手法を使っているので **Application** として扱い分けるべき、という日本のコメントは否決され、従来どおり全て **Annex B** に掲載されることになった。ただし、各事例（特に日本以外の2事例）に対して、規格本文の記述に沿ったフォーマットに修正せよという要請がなされた。最終的には以下の4事例が採用される予定。

1: Example of eco-efficiency assessment applied to electronics products according to the Guidelines in Japanese electronics industry（日本の「共通ファクターX」での算出方法を用いた白熱電球と電球型蛍光灯の評価事例）

2: Example of eco-efficiency assessment based on the integrated assessment approach（日本の一部企業で実施している重み付け手法を用いた、従来型とサイクロン型の掃除機の評価事例）

3: Application of eco-efficiency assessment in Mexican petrochemical industry（メキシコのエチレン精製工場の評価事例）

4: Application of eco-efficiency assessment - chelating agents（スウェーデンの化学物質評価事例）

What's Ahead?

- 2010年10月15日　Annex Bに記載された事例の改訂案提出
- 10月下旬　DIS案をエディティンググループに回付
- 11月7日　DISをWG7に回付
- 11月15日　DISをSC5に登録
- 12月1日　DIS投票開始（5か月投票）
- 2011年5月1日　DIS投票締切
- 6月　次回SC5/WG7会合開催
  （6/26～7/2、オスロ総会期間中）
- 9月　FDIS投票開始（2か月投票）
- 12月　ISO14045発行