



Summer University 2003 Châlons en Champagne
Technology and Sustainable Development in Europe today

Sustainability in Engineering Education and Training : Canada Case

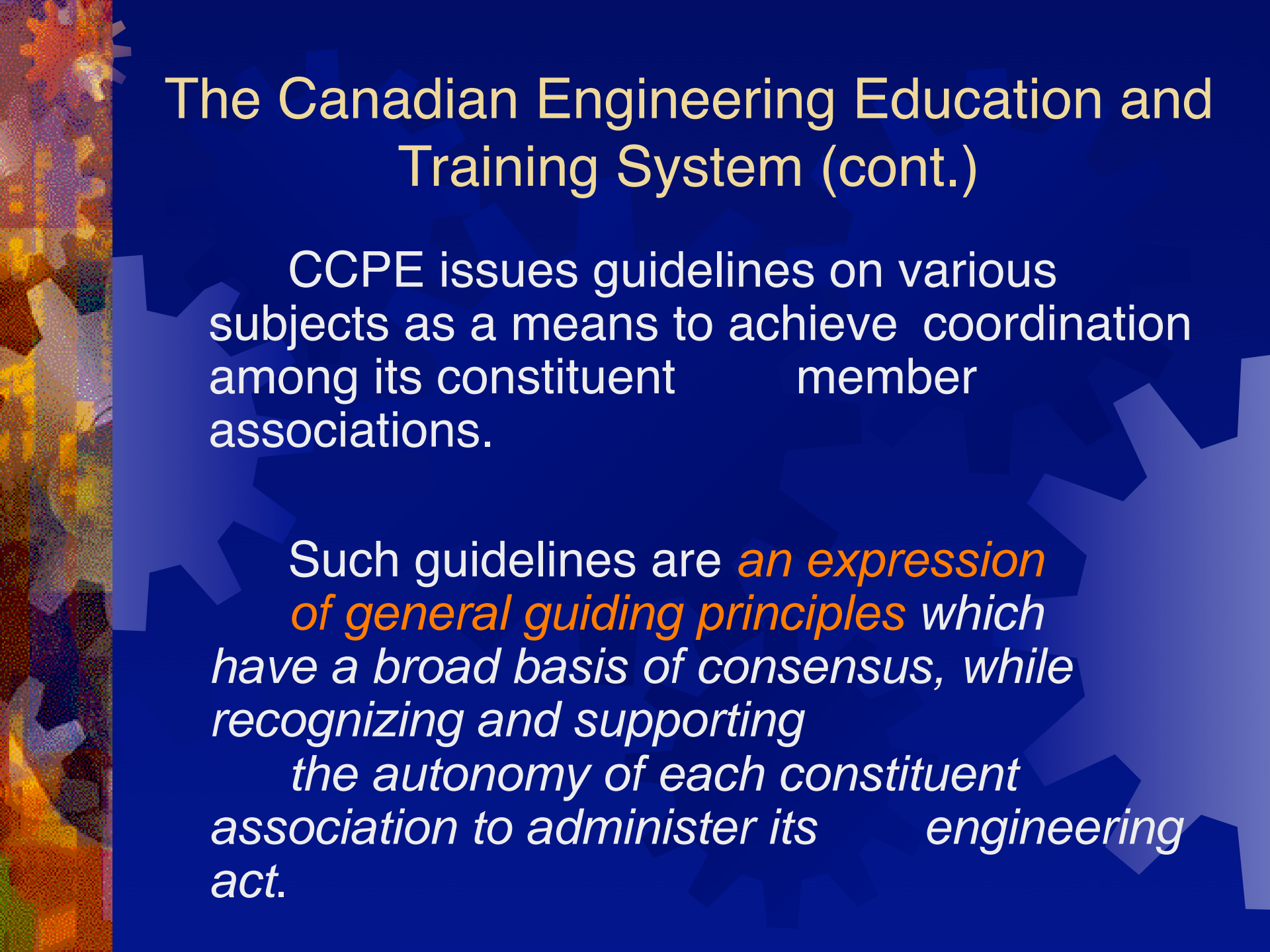
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The Canadian Engineering Education and Training System

- *Provincial and territorial associations of professional engineers are responsible for the **regulation** of the practice of engineering in Canada.*
- Each association has been established under an act of its provincial or territorial legislature and serves as the **licensing authority** for engineers practising within its jurisdiction. The Canadian Council of Professional Engineers (CCPE) is the **national federation** of these associations.

The Canadian Engineering Education and Training System (continued)

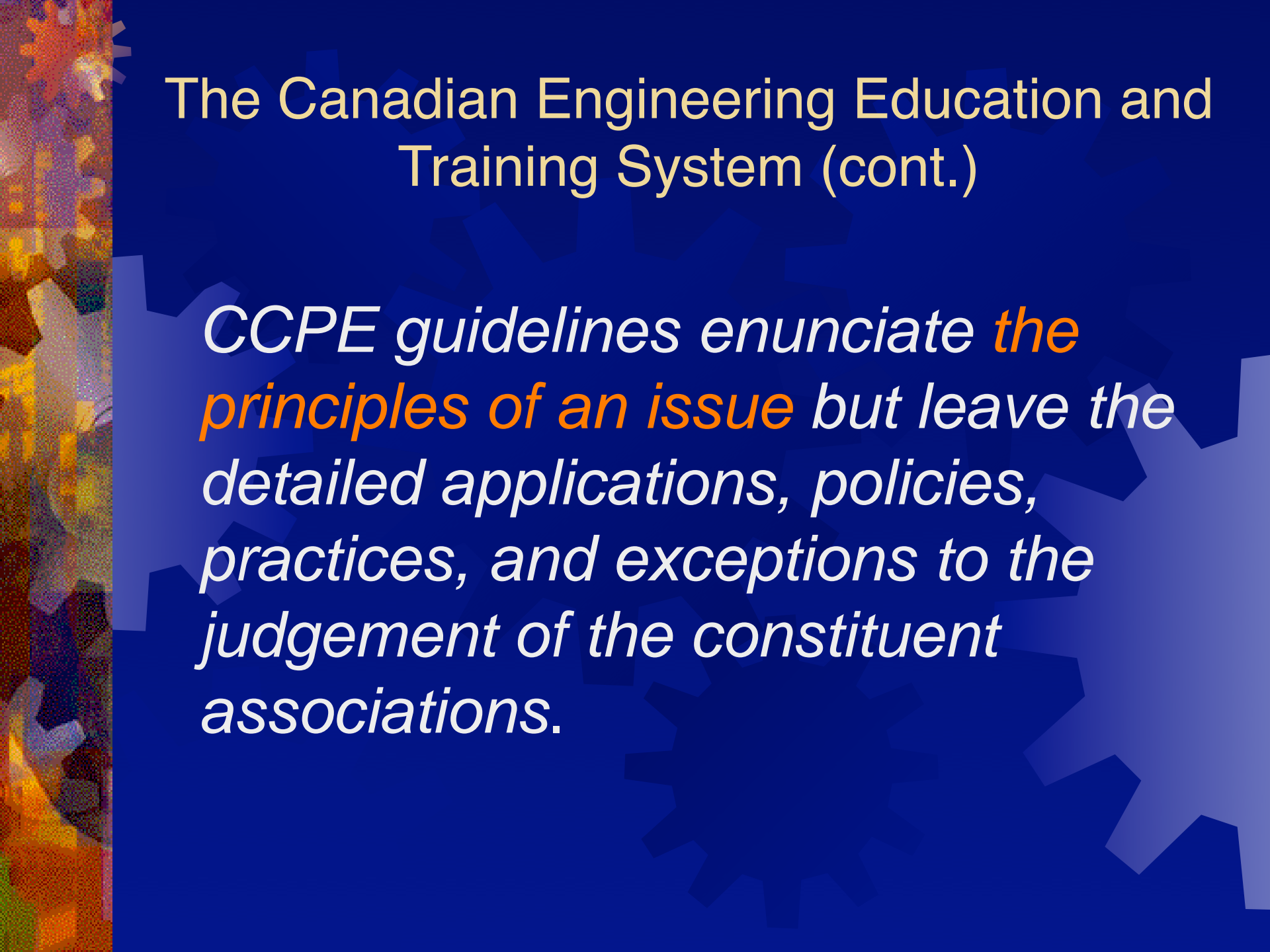
CCPE provides a *coordinating function* among the provincial and territorial associations, fostering mutual recognition among them and encouraging the greatest possible commonality of operation in their licensing functions.



The Canadian Engineering Education and Training System (cont.)

CCPE issues guidelines on various subjects as a means to achieve coordination among its constituent member associations.

Such guidelines are *an expression of general guiding principles* which have a broad basis of consensus, while recognizing and supporting the autonomy of each constituent association to administer its engineering act.



The Canadian Engineering Education and Training System (cont.)

*CCPE guidelines enunciate **the principles of an issue** but leave the detailed applications, policies, practices, and exceptions to the judgement of the constituent associations.*

The Canadian Engineering Education and Training System (cont.)

Each Provincial and Territorial Engineering Act *defines* the practice of engineering for the purpose of restricting practice to those individuals who meet qualifications standards appropriate to ensure the protection of the public.

Interpretation of the definition with respect to its application in individual circumstances is carried out by each provincial/territorial licensing body and its local judiciary.

The Canadian Engineering Education and Training System (cont.)

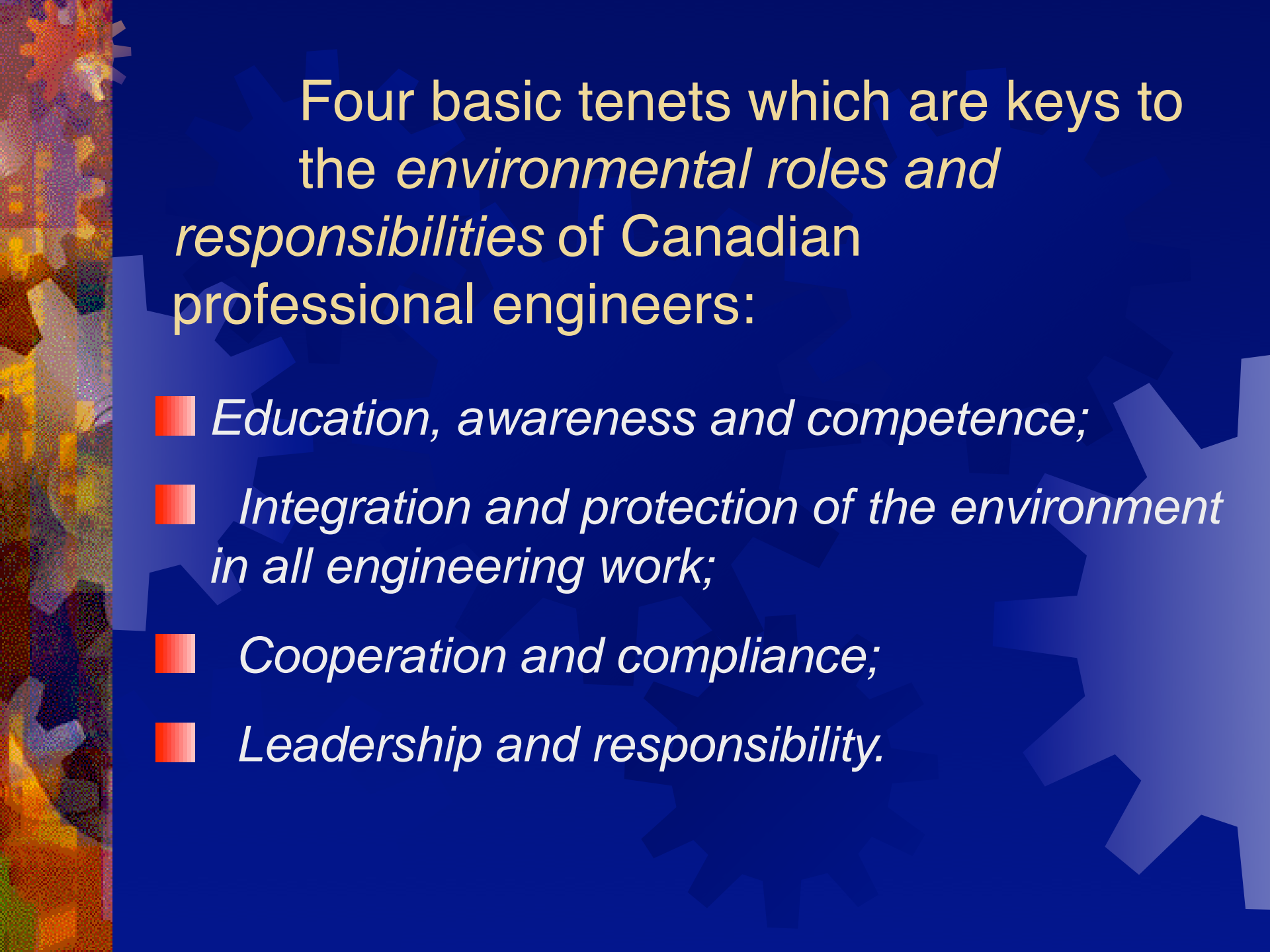
“The practice of professional engineering means any act of planning, designing, composing, evaluating, advising, reporting, directing or supervising, or managing any of the foregoing, that requires the application of engineering principles, and that concerns the safeguarding of life, health, property, economic interests, the public welfare or the environment”.

CCPE

How the sustainability is integrated in the Canadian Education and Training System?

“Sustainability is defined as a process or state that can be maintained indefinitely□
Sustainability integrates an *appropriate balance between a viable economy, protection of the environment and social well-being*. Sustainable development is development that *supports the concepts of sustainability and that meets the needs of the present without compromising the ability of future generations to meet their own needs*”.

CCPE

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Four basic tenets which are keys to the *environmental roles and responsibilities* of Canadian professional engineers:

- *Education, awareness and competence;*
- *Integration and protection of the environment in all engineering work;*
- *Cooperation and compliance;*
- *Leadership and responsibility.*



Five principles underly the education for professional engineers :

1. All engineers must ensure that they are suitably equipped to practice in an environmentally responsible manner.
2. All engineering work must include an evaluation of its impact on the environment and of its sustainability.



Five principles underly the education for professional engineers (cont.) :

3. All engineers should play a prominent role in promoting compliance with sound environmental practices, and in promoting the principles of sustainability.



Five principles underly the education for professional engineers (cont.) :

4. They must comply with regulations and cooperate fully with regulating authorities.
5. Engineers should be mindful of the political and social environment, and, at all times, act with integrity, openness, and honesty. They should seek public input where appropriate.

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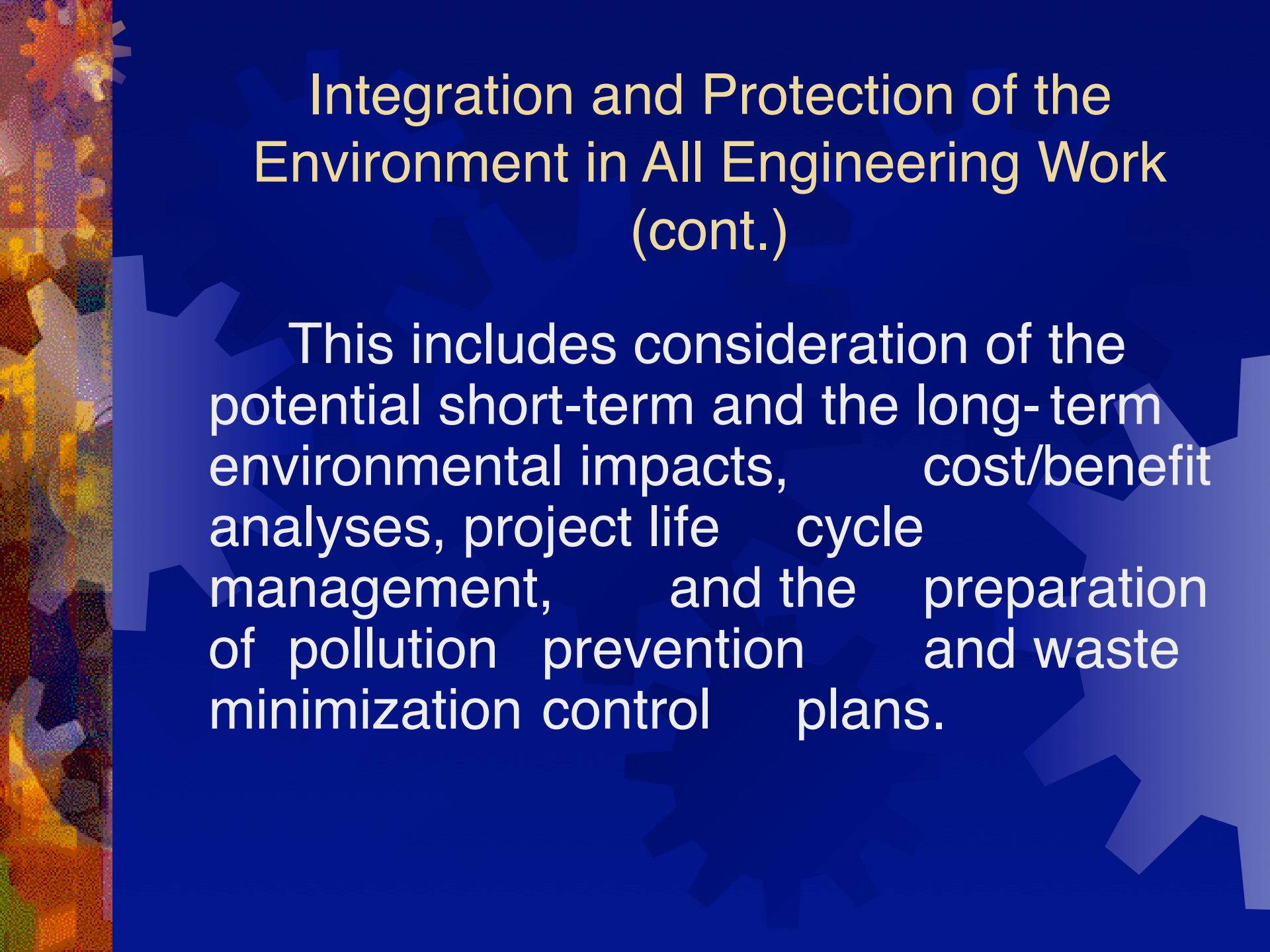
Integration and Protection of the Environment in All Engineering Work

All engineering work in Canada must include an *evaluation of its impact on the environment and of its sustainability*. The following principles guide the integration of the environment into engineering decisions:

Responsible, informed judgement and sound planning are key to integrating sustainability concepts and environmental considerations into day to day practice.

Integration and Protection of the Environment in All Engineering Work (cont.)

- Engineers must *strive to develop solutions to engineering problems that the environment can sustain over the long term.*
- Engineers must promote the *wise and efficient management of resources.*
- Engineers must *adhere to the concepts of sustainability.*



Integration and Protection of the Environment in All Engineering Work (cont.)

This includes consideration of the potential short-term and the long-term environmental impacts, cost/benefit analyses, project life cycle management, and the preparation of pollution prevention and waste minimization control plans.

In Practice

- In the undergraduate cursus, there is very few specified courses on the sustainability development (in many case, only one course deals with environment in general, taught by chemical engineers).
- It is matter of a good will. Engineers should fully respect the recommendations of their national council.
- In Chemical engineering, there is a specialization which can be choosen (10 courses) which leads to a Master degree in Environnement engineering.

What should really be done?

Economic analysis suggests five principles which can provide an incentive approach which leads to sustainable development:

- The full-cost principle;
- The cost-effective principle;
- The property rights principle;
- The sustainability principle;
- The information principle.

These principles have to be integrated at the early stage in the Engineers training.

Conclusion

- The nation used to be a sufficient form of political organization for resolving environment problems, that may not be the case.
- Solving problems such as global warming, ozone depletion and the loss of biodiversity requires *international cooperation*.
- Forging new international agreements is not enough. To produce the desired effect, *the agreements must be enforceable*.