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The seven sustainability competences according to the RESFIA+D Model. Part A: conceptual background

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Abstract:

Aim: Analyse Aim: The article describes the origins, structure and validation of a model for professional competences for sustainable development, called RESFIA+D. The model provides an assessment and policy instrument that can easily be applied practically.
Companies, NGO's and other organizations may apply RESFIA+D as a structured tool for human resource development (HRD). Institutions for higher and vocational education can use the instrument for education (re)development, where curricula and didactic approaches are derived from a systematically designed competence profile in which sustainable development is integrated. Finally, individual professionals may use RESFIA+D as a tool for professional development.

Design / Research methods: The article defines the concepts of "competence" and "competent professionals", in an easily understandable style. Next, the structure of the RESFIA+D model is described. Scientific details, such as origins and validation, are described elsewhere; references are made to other sources.
The basic set of RESFIA+D competences is combined with a structure of seven competence levels, which allows users to express the assessment results on an ordinal scale. This scale enables users to design plans for systematic improvements, both at a strategic and an operational level.

Conclusions / findings: RESFIA+D was applied successfully within companies, universities, and by individual professionals. Details of the applications will be offered in a follow-up article called "The Seven Sustainability Competences according to the RESFIA+D Model. Part B: Practical Experiences" in this same journal. Using a "cover" principle, the model is in accordance with, and complements other models for SD (sustainable development) competences.

Originality, value of the article: The article focuses in a unique way on the roles of individual professionals towards sustainability, whereas most or all usual assessment models focus on the roles of either entire organizations, or of individual persons seen as civilians or customers.

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1. Introduction

Various sources – e.g. books and presentations – distinguish two kinds of roles of individuals: the civilian and the consumer. For a responsible civilian, driving 65 mph on a highway seems like a pretty fair speed, and eating healthy food appears important. However, as a consumer, the same person may wish to drive faster, and not just to buy responsible food in the supermarket but also those nice and shiny, sweet or spicy snacks. It is a constant struggle: the sensible citizen versus the easily tempted consumer.

Actually, both have opportunities to act sustainably. The citizen may vote conscientiously and participate in discussions to support civic organizations. The consumer may carefully use electricity and water or buy fair trade products, sustainable fish, and FSC-certified wood – and never more than needed.

However, there is a third role: the professional. This article addresses those professionals.

It is true that many books and websites dealing with sustainability in the professional world have been introduced. However: nearly without exception, they are about companies and organizations as a whole. Nevertheless, in the end, anything those businesses or institutions do is the work of separate individuals. Those professionals – ranking high or low in the organization, from CEOs and top managers to production employees, administrative staff, nurses or janitors – all matter. About them, the individual professionals, not much has been written yet. That is the reason for this article, which offers a well-structured set of professional competences for sustainable development. The roles of the individual professionals are extremely important because:

- Every decision made by a company, government, or organization is ultimately taken by human beings.
- All actions undertaken by a company, government, or organization are always performed by human beings.

This article is dedicated to all of those people: individuals at work. For those individuals, a set of competences was designed. The set is called "RESFIA+D", which is an abbreviation. The first six characters, "R E-S-F-I-A", represent general competences, i.e. those that may be expected from any professional: "Responsibility", "Emotional intelligence", etc. The seventh, "D", is short for "Disciplinary". That is to say: related to separate professions or disciplines". The entire model is shown in Figure 1.

Figure 1. The RESFIA+D Competences Model

RESFIA+D: The Seven Competences of the Sustainable Professional

Competence *R*: Responsibility *A sustainably competent professional bears responsibility for his or her own work.*	**Competence *E*: Emotional intelligence** *A sustainably competent professional empathizes with the values and emotions of others.*
R1. Create a stakeholder analysis on the basis of the consequence scope and the consequence period	E1. Recognize and respect his or her own values and those of other people and cultures
R2. Take personal responsibility	E2. Distinguish between facts, assumptions and opinions
R3. Be held personally accountable with respect to society *(transparency)*	E3. Cooperate on an interdisciplinary and transdisciplinary basis
Competence *S*: System orientation *A sustainably competent professional thinks and acts from a systemic perspective.*	**Competence *F*: Future orientation** *A sustainably competent professional works and thinks on the basis of a perspective of the future.*
S1. Think from systems – flexibly zoom in and out on issues, i.e. thinking analytically and holistically in turn	F1. Think on different time scales – flexibly zoom in and out on short and long term approaches
S2. Recognize flaws in the fabric and sources of vigor in systems; have the ability to use the sources of vigor	F2. Recognize and utilise non-linear processes
S3. Think integrally and chain oriented	F3. Think innovatively, creatively, out of the box
Competence *I*: personal Involvement *A sustainably competent professional has a personal involvement in sustainable development.*	**Competence *A*: Action skills** *A sustainably competent professional is decisive and capable of acting.*
I1. Consistently involve sustainable development in the own work as a professional (sustainable attitude)	A1. Weigh up the unweighable and make decisions
I2. Passionately work towards dreams and ideals	A2. Deal with uncertainties
I3. Employ his or her conscience as the ultimate yardstick	A3. Act when the time is right, and not go against the current: 'action without action'

+ Competence *D*: Disciplinary Competences

A sustainably competent professional possesses a rich variety of competences for sustainable development that are specific to his or her profession.

D1, D2, D3, … :
To be specified separately for all kinds of sectors, disciplines, professions, etc.

Source: Authors own elaboration based on Roorda (2017), Roorda and Rachelson (2018)..

2. Competent professionals

A competence: What is it, really? Or, to put it another way, what is a competent professional? Quite a few books have been written about these two questions: highly complex theories - now and then based on thorough scientific studies. But it does not have to be that difficult. Actually, it is very simple:

A competent professional is someone you will ask to do a job for you again.

This is because he or she recently did it in a way you liked.

2.1 The competent plumber

In order to imagine how someone like that would act, this (kind of) definition will be explained in a way that is not too complicated. It is not based on an abstract kind of profession that cannot be grasped easily, but instead based on the example of a professional with a clearly visible task in a familiar environment.

As a starting point, imagine a dramatic situation in your own house. A small catastrophe. An imaginary situation, by the way, hopefully not a real one. What has happened? Your son, three years old, has – just for fun – been hanging on the bathroom sink, which has completely broken off the wall and is now lying on the floor. Your son is all right, but the bathroom less so. The water pipe has shattered into pieces, and now you have a beautiful "fountain" right where you always dreamed of *not* having one. Water is gushing out! It has already flooded the bathroom floor and the landing and is starting to run down the stairs like a waterfall. The hall and living room are about to turn into a sea. What about you – what do you do? You can think of just one thing to do: panic!

"Call the plumber…" you sigh, and so you do. Later, the plumber arrives. So now, what do you expect he – if your plumber is a male - will do, as a competent professional?

The first thing he does is eliminate the immediate cause of the problem, making sure that it does not get any worse. That is to say: He needs to find the main water supply line and turn the shut-off valve handle. And he definitely should not ask you

where this handle is, for you are panicking right now. All of a sudden, you don't know anything anymore. So, the good man has to know, all on his own, where he has the biggest chance of finding the shut-off valve: in this case, downstairs under the doormat by the front door, right? Without hesitation, he lifts the mat, removes the wooden panel, and shuts off the main water line. Well, that is something.

The second thing he does is calm you down so that you can contribute something useful. So, he starts talking to you, telling you things like: "Look, it isn't really so bad. It's clean water after all. We will fix it. Now, if you could get me a couple of buckets and some towels, I will…" et cetera. It is reassuring when he does that. Your mind clears a little, and your sense returns.

Only after this has been done, the plumber will go upstairs, equipped with the necessary tools, where he will start doing the things you would expect primarily from a person like him. So, he will "plumb", or whatever it may accurately be called, and start repairing the water pipe and the sink.

2.2 What he actually did

Someone who acts in such a calm, competent way is definitely a professional. And, he did much more than just the technical stuff you might associate first when you think of his profession. In his first act in this terrible situation, his role was primarily that of a disaster fighter. His action, his achievement, was to shut off the main water line. In doing this, he made use of his architectural insight regarding how houses in your country are usually constructed. At that moment, the tool he used was his architectural insight. In his second achievement, calming you down and giving you some directions, he acted in a very different role, that of an aid worker. The tool he used this time was his knowledge of people.

Only in his third role, he performed as a technician when he started repairing. For this he probably used tools such as pipe wrenches and a soldering torch.

Context, roles, achievements, and tools

Context, roles, achievement, and tools – these together define competences. Here is a brief overview.

Context:	Inundation in a bathroom
Role #1:	Disaster fighter
Achievement:	Find main water line and turn it off
Tool:	Architectural insight
Role #2:	Aid worker
Achievement:	Calm people down, give directions
Tool:	Knowledge of people
Role #3:	Technician
Achievement:	Repair broken sink
Tools:	Pipe wrenches, soldering torch, etc.

In the bathroom catastrophe scenario, the plumber established three different competences, and at the right moment, he shifted fluently from one role to another. This wonderful example – it is *almost* a shame it did not really happen – provides answers for the two questions this section started with.

*A **competence** is the ability to deliver, in a given **context**, in a certain **role**, solid **achievements** by making use of appropriate **tools**.*

*A **competent professional** is someone who is able, in a range of contexts, to shift flexibly between the various roles that are demanded, and who delivers solid achievements in each of them.*

A person who has proved being able to do that – that is someone you will ask to do a job for you again.

3. Sustainably competent professionals

When people are asked what they associate with the word "sustainability", some will immediately mention nature and the environment: climate change, for instance, or aerosols.

Others will quickly add, "But wait, sustainability, isn't that about people, too?". And when asked for an explanation, they may mention poverty and hunger in developing countries, refugees, or discrimination and issues concerning a multicultural society.

Indeed, sustainable development is about many, many issues. Sometimes, this makes it hard for people to understand the concept properly. It may seem as if *every* problem we are struggling with – in the world, in Europe, Africa, or Asia, in your country, or even in your own town or village – has to do with sustainability. Many people have the feeling that "sustainability" is some sort of container into which you can throw each and every problem in the entire world. If this is true, then what is the use of such a word? What does it explain? How can you ever know how to live or work in a sustainable way?

The concept of "sustainable development" was used for the first time in 1980, in a publication of three global organizations for nature and the environment (IUCN, UNEP, WWF 1980). In the following years, the Brundtland Commission performed a thorough study on behalf of the United Nations. In 1987, the commission published its final report called "Our Common Future" (WCED 1987). According to the report, sustainable development is:

"*a development that meets the needs of the present without compromising the ability of future generations to meet their own needs*".

In other words:

On the one hand, sustainable development is about *now*: about the desire to grant every person in the world a decent life. This concerns, for example, combating poverty and hunger. Moreover, it includes quality education and health care for everybody – wherever in the world – a healthy living environment, freedom,

democracy, safety, and human rights. In short, it gives each human the chance to be a full member of society.

On the other hand, sustainable development is also about *later*: about the concerns that we are overexploiting our planet with our present lifestyle. It is about our desire to grant our children, grandchildren, and great-grandchildren a decent future, which is only possible if we drastically change our present way of living.

3.1 Solutions that really work

Some people wonder – are those two, *now* and *later*, really connected? What makes sustainable development different from a grab bag of issues, a *container concept*? Actually, all those issues in the "grab bag" are strongly linked to one another; they influence each other in many ways.

An example illustrates this. One of the big issues of our generation is world population growth. This growth takes place at dazzling speed. It took mankind hundreds of thousands of years to grow to one billion people. This point was reached around the year 1800. The second billion took us less than 130 years. In 2011, we completed the seventh billion, an accomplishment we achieved in just 12 years!

What is driving such growth? All right, sex, of course. But that is certainly not the only answer. An important key lies in the fact that population growth occurs almost entirely in poor countries. Why there? Because the people there need children – to provide for them in old age. When you live in poverty, your children are seen as the only ones who will feed you, clothe you, and house you when you are old. Moreover, if child mortality in your country is high, you may certainly hope to have a lot of kids! It is a fixed pattern: *Everywhere where prosperity increases, the birth rate decreases*. In various wealthy countries, the population is actually shrinking slightly.

If you want your great-grandchildren to have a decent future, global population growth must come to a halt; so much is absolutely certain. If not, our planet will not survive. Managing population growth depends upon solid economic growth in developing countries. So even if you don't experience the wish that poor people become prosperous out of a feeling of solidarity or compassion, you still would be

wise to wish them prosperity from a rational perspective. It is quintessential for your own future and that of your children and their offspring.

On the other hand, such strong economic growth may, of course, increase the global *ecological footprint* considerably, as the present Republic of China illustrates, for example, unless we find clever ways to avoid this. Partly, this can be done with the help of new science and technology. The rest will have to be accomplished through changes in our behavior as consumers.

This example shows that poverty, economy, ecology, science, technology, and human behavior interact strongly with each other. For that reason, sustainability is not simply a container or grab bag with all problems thrown separately into it. On the contrary, sustainability is the only way to understand the ways in which all those problems and issues are linked and to find solutions that really work.

3.2 The Triple P

The way in which the Brundtland Commission describes sustainable development has been generally accepted. However, in real life it is hard to apply practically. "*Meet the needs of the present generation*". Right, but how? And by the way: *which* needs? Should everybody possess a second car and get a new smartphone every six months? "*Future generations*" – wonderful, but how many generations? A thousand?

Many models have been designed to explain sustainability more concretely. One of the best known was created by Ismail Serageldin in 1996: the "Triple P", i.e. the three P's: "people", "planet", and "profit". Together they are called the "pillars of sustainability". They can be summarized as follows (Roorda 2017):

Social sustainability ("people") at an individual level is about respect for human rights, freedom and safety, cultural values, education and health, personal development, diversity, empowerment and participation. At a societal level, it concerns peace, democracy, solidarity, and social cohesion.

Ecological sustainability ("planet") relates to conservation and resilience of the natural environment. This implies that ecosystems and biodiversity are protected

and that the ability of the natural environment to provide us with resources and regenerate our waste is not harmed.

Economic sustainability ("profit") is present if development toward social and ecological sustainability can take place in a sufficiently stable economic environment and is financially feasible, and if individuals, families, and communities are guaranteed to be free of poverty. (Sometimes, instead of "profit", the broader concept of "prosperity" is used.)

Sustainable development means that all aspects and themes above are seen as mutually dependent and interrelated, in that the various interests, problems, and solutions are constantly and harmoniously weighed against and connected with each other. This principle is often referred to as: "The three P's must be in balance".

3.3 The necessity of sustainably competent professionals

The Brundtland report and the Triple P don't guarantee that sustainable development is now crystal clear to everybody or that it is easy to decide in all cases which decisions or actions are sustainable and which are not. Choices concerning sustainable development are usually far from simple. If the use of oil and gas contributes to the greenhouse effect and hence to climate disruption, would it be wise to use nuclear power for a couple of generations, or would that be even more unsustainable? Should we make cars more sustainable, or would that be highly unsustainable in the long term because we might have to get rid of all or most cars? Should we ban child labor in Asia and Africa as fast as we can, even if this means that the parents who depend on their children's income would starve?

No easy answers exist. The dilemmas are complicated, and so are the solutions. At the same time, there are lots of opportunities – opportunities to make the world more beautiful and just than it is at present. Wouldn't it be great if there were no more hunger anywhere? If war could disappear altogether? If all people could live freely and securely? If nature were resilient? These and many more goals have been formulated in a concrete and assessable way in the seventeen *Sustainable Development Goals* (SDGs), also known as *Agenda 2030* (UN DESA 2015).

Whether these goals are realistic is a matter of debate, but there are two things that are undoubtably true.

The first certainty is: *If we all believe that the human world is doomed to perish, we will be right*. Negative thinking will become a *self-fulfilling prophecy*, a prediction that makes itself come true, simply because everybody will lean back and do nothing. Consequently, what we should do is roll up our sleeves. Let us work on sustainability with everything we have!

The second certainty is: Because solutions are complicated, we need everybody to make them work. At present, a number of companies – large ones and small ones – are contributing intensively to sustainable development, mainly because, *by coincidence*, they are managed by people who have decided to do so. The same is true for governments of countries. Some have a genuine sustainability policy, but only until the next election brings in another government. In other words, whether a company or a country strives to operate sustainably depends on who happens to be in the executive position, i.e. ultimately by coincidence.

However, sustainable development is far too essential to leave it up to chance. In order for it to become institutionalized, we need everybody, each professional, in lower and higher positions, in whatever enterprise, government, educational institution, or societal organization.

4. *RESFIA+D*: The Seven Sustainability Competences

Sustainably competent professionals are what our society needs - in huge quantities, in all kinds of professions, and across every thinkable sector: industry, service, finance, government, healthcare, education, farming, fishing, and forestry. We need them in multinational companies, small and medium enterprises (SMEs), family-owned businesses, commercial companies, NGOs, and informal associations.

A person can be a sustainably competent professional at *every level* within an organization, regardless of whether they are a CEO or a CFO, a middle manager, a

specialist, a salesperson, or an assembly line worker. *Every professional can contribute to sustainable development.*

To prove this, an instrument was developed to investigate how one can significantly contribute to sustainable development. The instrument is called *RESFIA+D*, and it consists of seven competences. Six of them are "generic" competences, which means that they are relevant for every professional. The seventh is called "disciplinary". Actually, this is an infinitely large group of competences linked to all kinds of specific sectors and professions because there is potentially an unlimited number of professions.

The *Seven Competences of the Sustainable Professional* are shown in Table 1. The table shows that each of the six generic competences is expressed in terms of three types of concrete professional achievements.

Table 1. *RESFIA+D*: Professional competences for sustainable development

The section numbers refer to the sections of a textbook called "Fundamentals of Sustainable Development" (Roorda 2017) in which this table is printed as Table 8.4.			
Competence R: Responsibility A sustainably competent professional bears responsibility for his or her own work. I.e.: the sustainable professional can …	Section	**Competence E: Emotional intelligence** A sustainably competent professional empathises with the values and emotions of others. I.e.: the sustainable professional can …	Section
R1. Create a stakeholder analysis on the basis of the consequence scope and the consequence period	§5.5	E1. Recognise and respect his or her own values and those of other people and cultures	§4.3
R2. Take personal responsibility	§8.2	E2. Distinguish between facts, assumptions and opinions	§8.5
R3. Be held personally accountable with respect to society (transparency)	§8.2	E3. Cooperate on an interdisciplinary and transdisciplinary basis	§1.3, §4.8

Table 1. Cont. …

Competence S: System orientation A sustainably competent professional thinks and acts from a systemic perspective. I.e.: the sustainable professional can …		**Competence F: Future orientation** A sustainably competent professional works and thinks on the basis of a perspective of the future. I.e.: the sustainable professional can …	
S1. Think from systems: flexibly zoom in and out on issues, i.e. thinking analytically and holistically in turn	§3.5	F1. Think on different time scales – flexibly zoom in and out on short- and long-term approaches	§5.5
S2. Recognise flaws in the fabric and sources of vigour in systems; have the ability to use the sources of vigour	Ch. 2-4	F2. Recognise and utilise non-linear processes	§7.3
S3. Think integrally and chain oriented	§8.3	F3. Think innovatively, creatively, out of the box	§8.4
Competence I: personal Involvement A sustainably competent professional has a personal involvement in sustainable development. I.e.: the sustainable professional can …		**Competence A: Action skills** A sustainably competent professional is decisive and capable of acting. I.e.: the sustainable professional can …	
I1. Consistently involve sustainable development in the own work as a professional (sustainable attitude)	§4.7	A1. Weigh up the unweighable and make decisions	§8.5
I2. Passionately work towards dreams and ideals	§4.2	A2. Deal with uncertainties	§6.3
I3. Employ his or her conscience as the ultimate yardstick	§8.2	A3. Act when the time is right, and not go against the current: "action without action"	§4.2
Plus: **Disciplinary competences** A sustainably competent professional possesses a rich variety of competences for sustainable development that is specific for his or her profession.			
D1, D2, D3, …: to be specified separately for all kinds of sectors, disciplines, professions, etc.			

RESFIA+D is a tool that can be used in three ways: (1) to design individual development plans; (2) to facilitate a strategy for human resource development (HRD) within a company; and (3) to (re)develop curricula in institutions of higher education. Before these three kinds of applications are to be explained, first some more details of the model have to be added, starting with an explanation of the roots of the model.

5. Theoretical backgrounds of *RESFIA+D*

In several European countries, a strong impulse for the definition of generic graduate qualifications came from the Bologna Agreement of 1999. Around 2001, Flanders and the Netherlands were preparing their accreditation system of higher education. As a consequence of the Bologna Agreement, they needed a clear distinction between the "first, second and third cycle" of higher education (in many countries equal to the Bachelor, Master and Doctor level). A "Joint Quality Initiative" was set up, together with several other European countries. During a meeting in 2004 in Dublin, the so-called "Dublin descriptors" were agreed (also called the "Bologna Qualification Framework"). This set of qualifications defines the differences between the three cycles, as Table 2 shows.

Table 2. (Selection of) Dublin Descriptors

Qualifications that signify completion of the first cycle are awarded to students who:	- have demonstrated knowledge and understanding in a field of study that builds upon and extends their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study; - can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study; - have the ability to gather and interpret relevant data (usually within their field of study) to form judgements that include reflection on relevant social, scientific or ethical issues; - can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences; - have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy.
Qualifications that signify completion of the second cycle are awarded to students who:	- (…) - can apply their knowledge and understanding, and problem-solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study; - have the ability to integrate knowledge and handle complexity, and formulate judgements with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgements; - can communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously; - (etc.)
Qualifications that signify completion of the third cycle are awarded to students who:	- (…) - have demonstrated the ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity; - are capable of critical analysis, evaluation and synthesis of new and complex ideas; - (…) - can be expected to be able to promote, within academic and professional contexts, technological, social or cultural advancement in a knowledge-based society.

Source: Joint Quality Initiative (2004).

The Dublin descriptors were used by many universities and study programs as one of the starting points for the definition of professional competences of their graduates. In the Netherlands, the national accreditation system of existing and new study programs in higher education was defined through an "Evaluation Framework" ("Toetsingskader"). One of the demands in this framework deals with

the end terms of the programs, which are explicitly based on the Dublin descriptors (NVAO 2003). An example of such a set of end terms, formulated as general competences, is shown in Table 3.

Table 3. General competences for Engineers

Segment	**Key competence**	**Key terms**
Engineer	Thinking in models, systems, processes	Find solutions through models, systems, processes; Analyze, evaluate, synthesize, solving problems; Transfer of knowledge and information
	Working with innovation cycles	Applied research; Phases in design or innovation cycle
	Role fulfilment	Making: project leader; Translating: salesman, consultant; Managing: manager, entrepreneur
	Professional	Awareness to use societal, ecological and economic boundaries; Awareness to transcend disciplinary boundaries; Strategic thinking; Sustainable development; Acting from relevant physical and business concepts, methods and tools
Self-guidance	Learning to learn	Attitude aimed at life-long learning; Independently decide and implement learning goals and -strategies, evaluating the results; Reflect on own behavior to give and receive feedback
	Take own responsibility	For professional and ethical dilemmas, make a decision based on solid societally accepted standards and values
	Take initiative	Adapt quickly to changing labor circumstances; Intrinsically motivated; Result oriented working based on perseverance
Social-communicative	Functioning independent or in a team	Carry out tasks according to planning, which contribute to a chosen result; As an expert, alone or as a team member, act according to customer wishes; As an expert, alone or as a team member, give advise about disciplinary or professional issues; Pay responsibility about own acting to oneself and to others
	Interdisciplinary communication	Function socially and communicatively effectively in a multidisciplinary environment within the professional context; Good oral and written expression within the professional context
	Leadership	Based on own leadership style, encourage employees to persevere, accept and learn from mistakes; Stimulate employees to take personal initiatives; Be a role model for employees; Show confidence and self-assuredness Give a feeling of shared responsibility to employees
Profession-specific		To be detailed by separate disciplines

Source: Authors' own elaboration.

5.1 Competences for sustainable development

In discussions with professors and lecturers in higher education, many times the same question has arisen: "Should 'sustainability' be added as an extra competence to our existing competence profile?"

This question raises the issue of the relation between competences and sustainable development, or more specifically: education for sustainable development (ESD).

The question shows that a lot of teachers find it hard to make a connection between ESD and competence-based education. If a "sustainability competence" is formulated as "the ability to think and act in a sustainable way" (as has been proposed by some), that does not really meet a desired characteristic of a competence profile, i.e. that the curriculum can be deduced from it. What exactly would "think and act in a sustainable way" mean? In which critical professional situations is it expressed, in what roles and with which tools?

Several approaches to "SD competences" are possible, as De Kraker et al. (2007: 105) describe. One is the "instrumentalist" approach, offering lists of knowledge, skills and values. Opponents advocate an "emancipatory" approach, putting an emphasis on raising a critical attitude of the students. A typical example is described by the so-called "*Gestaltungskompetenzen*" (lit. "shaping competences").

"Within the international discussion about ESD different sets of competencies as educational objectives of ESD exist but still a broad consensus can be found of the basic aspects that need to be involved. The German debate about ESD led to a definition of key competencies ("*Gestaltungskompetenz*") to provide for an active, reflective and cooperative participation in the obligation to shape a sustainable development. This definition is based upon an understanding of education which is marked by the education-theoretical premises of openness, reflexivity and future viability:

- *Openness*, because the existing stock of knowledge has proved to be subjective and relative.
- *Reflexivity*, because subject and object underlie dynamic changes which may only be grasped by a higher-level reflexivity.

- *Future viability*, because in the increasing dynamic of global change, only he who has learned to responsibly cope with insecurities and risks will remain functionable.

The acquisition of Gestaltungskompetenz is seen as central educational objective of ESD. The term is used to describe the forward-looking ability, "to modify and to shape the futures of those societies we live in via active participation in terms of a sustainable development" (Barth, Burandt 2008, citing De Haan 2002, and De Haan, Harenberg 1999).

According to De Kraker et al.. (2007), this concept of "*Gestaltungskompetenz*" offers a combination of the instrumentalist and the emancipatory approach. The concept was detailed by De Haan (2006) as a set of key competences:

1. competence in foresighted thinking;
2. competence in interdisciplinary work;
3. competence in cosmopolitan perception, transcultural understanding and co-operation;
4. participatory skills;
5. competence in planning and implementation;
6. capacity for empathy, compassion and solidarity;
7. competence in self-motivation and in motivating others; and
8. competence in distanced reflection on individual and cultural models.

This list has its roots not in the process of educational developments but rather in the development of the science and philosophy of sustainable development. It is striking that the above list of SD competences shows a strong resemblance with the various sets of generic competences that were described in Tables 2 and 3. The two concurrent developments, within education and within sustainability science, have led to conclusions that are remarkably similar. This is illustrated by the fact that Barth et al. (2007) applied De Haan's model in order to specify the characteristics of ESD. It appears that SD competences are not far from general competences that one might expect from any graduate, whether sustainable development is in mind or not. In other words: actually, sustainable development is mainly a matter of common sense and sound professional behavior.

Nevertheless, there is a difference between the sets of generic competences, shown in Tables 2 and 3, and the above set by De Haan. Where most of De Haan's competences are value-free, describing desired professional behavior in a "technical" way, just as the generic competences of Tables 2 and 3, there is one competence which is normative and not value-free, and which refers to an attitude or to personal emotions rather than to behavior: #6, the capacity for empathy, compassion and solidarity.

Not all ESD developers added such values to their sets of SD competences. One such set was published by the Commission on Education and Communication of the IUCN, which stated (Hopkins, McKeown 2002):

"To be successful, ESD, like all good education, must blend knowledge and skills. ESD must provide practical skills that will enable people to continue learning after they leave school, secure sustainable livelihoods, and live sustainable lives. These skills will differ with community conditions. The following partial list of skills will help initiate discussions about the types of skills students will need as adults in those communities. Note that these skills, while totally consistent with good basic education, also fall into one or more of the three realms of sustainable development:

- the ability to communicate effectively both orally and in writing;
- the ability to think about systems (both natural and social systems);
- the ability to think in time – to forecast, to think ahead, and to plan;
- the ability to think critically about value issues;
- the ability to comprehend quantity, quality, and value;
- the capacity to move from awareness to knowledge to action;
- the ability to work cooperatively with other people;
- the capacity to use various processes – knowing, inquiring, acting, judging, imagining, connecting, valuing, questioning and choosing; and
- the capacity to develop an aesthetic response to the environment".

In this set, values are mentioned several times, but there is no clear indication that the authors wish that the professionals act based on a set of ethical or normative values, let alone compassion. This may be a consequence of the characteristics of professional profiles in general, which usually are formulated in terms of behavior

rather than on attitudes or internal motivations or emotions. However, another author, Van der Woude (2008), expressly includes such elements. He describes SD competences as a set of professional roles:

- The global citizen / steward
- The professional
- The equilibrist
- The forward thinker
- The connector
- The steersman
- The function-oriented innovator
- The creatively involved

Van der Woude explains each of these eight roles. For example, the "global citizen / steward" is described as follows:

"The global citizen / steward cares for himself, for others and for the physical reality. He is convinced that we should carefully deal with the finite stock of resources and that we should prevent environmental pollution and damage to nature in order to preserve our planet. He understands that this is only possible if we do not transfer our problems to others, don't live at the cost of others, but share prosperity and well-being equally among the world population. North cannot over-consume at the cost of South. To reach a global balance, the global citizen / steward thinks we should be prepared to listen to each other, and that, instead of competition, we should seek cooperation and that we should work on a safe environment in which it is good to live and work".

Such a description is clearly value-driven, and goes beyond the generic competences shown in Tables 2 and 3. Other proposed sets of SD competences seem to be somewhere in between, e.g. Heideveld (2003) and De Groene (2003: 26). The same is true for the ESD competences defined in the Barcelona Declaration of 2004 (see: Segalàs 2009).

Other sets of SD competences come from a slightly different angle, that of transition management. Andringa & Weterings (2006, 2008) designed a competence profile for transition professionals. Jansen, Weaver & Van Dam-Mieras (2008) added more details, out of which Table 4 was formed.

Table 4. Competences of transition professionals

Cluster	Role	Competence	Methods & techniques
Pattern recognition	Manager	• Integral thinking • Frankly interviewing • Analytical skills • Conceptual power	Integral system analysis Actor and network analysis Historic regime analysis Fact finding
Reorientation	Innovator Researcher Team worker Manager	• Vision and inspiration • Guts and Power of persuasion • Creativity and new ideas • Consciousness of history	Scenario analysis Future explorations Backcasting Reframing
Experimenting	Innovator Networker Manager Team worker	• Alliance management • Mobilizing power • Organizational skills • Second order learning	Actor and network analysis Strategic niche management Flexible design
Anchoring and scaling up	Net-worker Researcher Manager	• Anticipation skills • Entrepreneurship • Power of persuasion • Lobby and networking skills	Actor and network analysis Integral system analysis Strategic niche management
Monitoring	Researcher Team worker	• Observation skills • Reflection skills • Anxiousness • Self-consciousness	Transition monitoring Evaluation techniques Learning histories Reflection sessions
Transition management	Researcher Team worker Manager	• Systems thinking • Feeling for timing • Balance contents, process and result	

Sources: Andringa, Weterings (2006, 2008); Jansen et al. (2008).

Sets of competences like the above may offer some clarity to lecturers wanting to integrate sustainable development into competence-based education. Nevertheless, in the eyes of many university lecturers they were not sufficiently operational, as meetings and discussions in the years around and after 2005 made clear.

Besides, managers of companies indicated that such competence sets were too abstract to allow them to apply the sets in real life, e.g. as a tool for HRM.

Repeated requests were received by the author of the present chapter from business managers and university lecturers to create practical clarity concerning the relations between competences and sustainable development. Hence, a project was started with the aim to design a model for competences for sustainable development that could be applied in higher education, in companies and other organizations, and by individual professionals who want to plan the next steps in their careers. Based on the above-mentioned sets of competences, *RESFIA+D* was developed, validated and improved between 2006 and 2012. It has been applied since 2009.

5.2 Later developments

Several researchers have studied *RESFIA+D*, applied the model, and compared it with other competence models. Lambrechts et al. (2013) compared *RESFIA+D* with De Haan (2006) and with Sleurs (ed., 2008), and next applied *RESFIA+D* in order to analyze the education of two Belgian universities.

The need for new paradigms in order to design and realize ESD strategies was emphasized by Martens et al. (2010), for which *RESFIA+D* was applied. The results were applied in Lambrechts et al. (2019) as a coding tool to describe the roles of individual sustainability competences in eco-design building projects.

More recent competence models were published by Wiek et al. (2011); UNECE (2011); Rieckmann (2012); and Dentoni (2012). Naturally, these were not applied for the development of *RESFIA+D*, since they were published after the model was completed. They were, however, applied when an extension of *RESFIA+D* was designed in the form of a set of disciplinary competences of educators, as will be described below.

An overview of these and other recent models for ESD competences, including *RESFIA+D*, was offered in Lambrechts et al. (2017).

6. Levels of competence

Professionals are either sustainably competent, or they are not? Of course not; that would be an oversimplification. In reality, it is more complicated; with respect to a variety of competences, some persons are more competent, while others are less so. A person may be a well-educated and experienced professional who is held in high esteem by everyone or a novice who has learned quite a few things but doesn't have much practical experience yet. A suitable model is the medieval concept of the *master* and the *apprentice*. The former has mastered the profession deeply. The latter is only allowed to work, for the time being, under the supervision of the master. He or she still has to acquire more skills and is not yet considered highly competent in the discipline.

To describe the sustainability competence levels, *RESFIA+D* applies more than just the two competence levels of the medieval guilds. Seven levels are distinguished.

Level 1: Apprentice

At the first level, you are an apprentice or a student. You have not yet gathered sufficient competences to practice your profession. You may assist your more experienced colleagues or teachers in the execution of their jobs, the main goal of which is not that you realize concrete achievements, but that you learn from your tasks. You may perform some of your activities in simulated work circumstances instead of real ones. Whenever you do work in a real professional context, your primary obligation is not to produce a result but to show your effort.

Level 2: Work under supervision

At the second level, you are able to perform your job fully or partially – under supervision. You are the "journeyman", the trainee who is able to achieve solid results with the aid of experienced colleagues. A typical example in the health care field would be the recent medical school graduate who is completing a residency under the supervision of a medical specialist.

Level 3: Self-direct

At the third level, you are able to bring into practice what you have learned as a self-directed professional. Not more, not less. At a practical level, you perform tasks that are in line with the usual demands of your profession. Your vision, your opinions, and your activities are mainly related to your personal expertise, your immediate work environment, and the customary work methods. Creativity is not demanded and generally not even appreciated.

Level 4: Integrate

At the fourth level, you are able to position your work within a wider context and benefit from that. In the performance of your job, you navigate a complex range of topics, work styles, persons, and cultures. You may do this:

- beyond the limits of your own expertise;
- taking into consideration different cultures, value systems, traditions;
- beyond the usual expectations and work methods of your profession; and/or
- in flexibly changing roles, e.g. managing.

Level 5: Improve

At the fifth level, you are able to implement concrete improvements in the work that you and others are doing. You oversee – both at a detailed level and at a systems level – your work and the system within which you perform your professional activities. You judge your own work and that of others with whom you cooperate critically, and you estimate its consequences in the widest sense. Based on that, you constantly aim at improving the work to which you contribute, and in doing so, you achieve noticeable results.

Level 6: Innovate

At the sixth level, you are the source of innovation within your discipline. You introduce innovative insights into your work, concerning:

- the goals or targets that have been set
- the means and methods that are applied
- the effects of the work

- the scope of those effects in space and time
- the underlying vision
- the relations inside and outside of your work environment or your discipline, e.g.: society as a whole

These innovations are demonstrably visible in your professional activities and in their results.

Level 7: Master

At the highest level, you are prominent within your discipline. You have reached "mastership". Others learn from you. You are their role model, their "archetype". Your inspiring leadership is recognized and accepted by all. Such masters are extremely rare. You may think of Nobel Prize winners and Oscar winners, or others who perhaps have not won official awards, but who are recognized at a conference or meeting because when they start talking, everybody else becomes silent and listens. Probably, you can name one or a few of those special persons within your own professional sector.

All levels

In order to contribute to sustainable development, you don't have to be a master. *Every* professional, working at *whatever* level, can be a sustainability hero. In order to prove this strong claim, several books have been written by the authors of the present article. These books establish this claim with the aid of a long series of practical examples, in which actual professionals, working in a wide range of disciplines and levels, tell their stories. Each of the *RESFIA+D* competences is illustrated, based on one or more such stories.

The first book in this series was written in Dutch (Roorda 2015), who also developed the *RESFIA+D* model. For the second version, written in English and based upon stories about American and Canadian professionals, Roorda cooperated with an American professor of Miami Dade College (Roorda, Rachelson 2018). The English book has the same structure and theoretical contents as the Dutch one; only the stories have been replaced.

Experts on sustainable development, education and management are invited to contact the first author and propose a cooperation on the development and production of a similar book in another language and/or geographical region.

The *RESFIA+D* assessment model is a part of a larger set of management tools, together called *Future-Focused Entrepreneurship Assessment* (*FFEA*). The *FFEA* model, its backgrounds and its practical applications are described in Roorda (2018).

The theoretical aspects of *RESFIA+D*, including its validation, are treated in Roorda (2016). Many details about both *RESFIA+D* and *FFEA* can also be found online (Roorda, n.d.).

7. Specifying the levels

As stated in the introduction, *RESFIA+D* can be applied in three ways, which will be described in Section 8. For all three of them, the tool is used as an assessment instrument, paving the way to create development plans.

In order to create a genuine and practical assessment tool, it is not sufficient to define a set of levels in general terms. It will also be necessary to define those levels in some detail: specified for all different competences. This is what was done during a project between 2007 and 2010, when *RESFIA+D* was first developed and theoretically and practically validated (Roorda 2010).

For this purpose, concrete behaviors were formulated for each of the six generic competences. More precisely, this was done for all three achievements of those six competences. This resulted in separate descriptions linked to the various competence levels of all 18 (6 x 3) achievements.

One example is shown here. For this purpose, Competence S is selected: *System Orientation*. Next, out of the three achievements that were defined for this competence, S2 is taken as an example, dedicated to *weaving faults and sources of vigor*. The achievements of S2 are described in Box 1.

Box 1. Example: general behavior of a generic competence

Competence S: System Orientation

A sustainably competent professional thinks and acts from a systemic perspective.

Achievement S2

You recognize flaws in the fabric and sources of vigor in systems, and you use the sources of vigor.

S2 behavior (general):

- You are aware, or you investigate, which flaws in the fabric are deeply integrated in the systems with which or for which you work. These flaws are the ultimate causes of un-sustainability
- You discover which sources of vigor are available in or around these systems in order to correct the flaws in the fabric. These sources of vigor are the powers we possess towards true sustainability.
- You succeed in effectively utilizing or mobilizing the sources of vigor, enabling you to contribute to diminish or even eradicate the flaws, or at least to decrease the negative consequences of them.

These achievements have been elaborated for several separate level descriptions. The separate level descriptions were defined for the competence levels 3 to 6, as these four levels are considered to be realistic levels, either as present or desired levels of professionals with practical experience during a number of years, or as realistic targets for education programs in higher education. The achievements of levels 3 to 6 of S2 are shown in Box 2.

Box 2. Example: levels of a generic competence

Competence S: System Orientation

A sustainably competent professional thinks and acts from a systemic perspective.

Achievement S2

You recognize flaws in the fabric and sources of vigor in systems, and you use the sources of vigor.

S2 behavior (levels):

Level 3: Apply

- *You analyze the structure of your immediate working environment.*
- *Based on this, you make a SWOT analysis.*

Level 4: Integrate

- *You make this SWOT analysis for the organization of which you are a member and its surroundings.*
- *You do so from a perspective of sustainable development, for example from the Triple P.*

Level 5: Improve

- *You make the SWOT analysis in close collaboration with representatives from all levels of your organization.*
- *Based on the SWOT analysis you formulate recommendations to use strengths and opportunities, to improve weaknesses and to anticipate on threats.*

Level 6: Innovate

- *You make the SWOT analysis also in close collaboration with representatives in the wide surroundings of your organization.*
- *You make recommendations to strengthen the structure of the system considerably.*

Together, the descriptions of the various levels for all eighteen (6 x 3) achievements form a ***Set of Competence Cards***, a reference map that can be used to assess the competences of individual professionals. The complete set can be downloaded as a pdf file; see Roorda (n.d.) in the *References* of this article.

Disciplinary competence levels

As stated earlier, an infinitely large set of disciplinary competences exists, due to the fact that there is an unlimited and ever-growing number of professions. If one wanted to define concrete competence levels for some of them, they would first have to develop a valid set of competences that are specific to a certain profession.

This is what was done in 2016, as a part of a Europe-wide project aiming at developing a set of sustainability competences for *educators*. The project, called *A Rounder Sense of Purpose*, was funded by the European Commission (Vare 2018). After studying relevant sources (Sleurs, ed. 2004; De Haan 2006; Wiek et al. 2011; UNECE 2011; Rieckmann 2012) and discussing the topic with the members of the international project team, a set of Educator Competences for Sustainable Development was proposed. By coincidence, this set consists of three achievements, just like the six generic competences. This is not a necessity; for other professions, the number might just as well be different. Anyway, the three achievements are:

+D for Educators:

D1. Innovate education, regarding structures, methods, and contents

D2. Offer challenging, learner-centered education within real-life contexts

D3. Involve sustainable development in learner assessments

After these three achievements were defined, it became possible to develop the competence level descriptions. As an example, Box 3 shows them for D2.

Box 3. Example: levels of a disciplinary competence

Competence D: Educator competence

A sustainably competent educator involves sustainable development in his or her professional activities wherever it makes sense.

Achievement D2:

You offer challenging, learner-centered education within real-life contexts.

D2 behavior (levels):

Level 3: Apply

- *You apply a variety of pedagogic and didactic methods, enabling the learners to understand the basic notions of sustainable development.*
- *You also stimulate learners to discover the relations between sustainable development and their own (present or future) neighborhood and/or profession.*

Level 4: Integrate

- *You guide learners to discover the relations between sustainable development*

and all topics in the curriculum, causing sustainable development to be a continuous thread or fundament throughout the curriculum.

- *Doing this, you enable the learners to act in a multidisciplinary way.*
- *You enable the learners to act within a real-life context, or at least within a realistic context.*

Level 5: Improve

- *Feedback from learners, colleagues and experts is used by you to systematically improve the learning process and your role in it.*
- *Topical developments are constantly observed by you, and used to keep the learning process up to date.*

Level 6: Innovate

- *You cooperate with colleagues from different topics, and with external experts, in order to let the learners operate in an interdisciplinary or even transdisciplinary context.*
- *Doing this, you show leadership among your colleagues and al others who are involved in the learning process in an educating capacity.*

8. The toolbox of the professional

Earlier in this article, competences were defined as follows: *A **competence** is the ability to deliver, in a given **context**, in a certain role, solid **achievements** making use of appropriate **tools**.*

In many cases, the tools of professionals are tangible such as hammers, pipe wrenches, or computers. Other tools are in your head: for instance, people skills or architectural insight. There are four kinds of such "mental" tools. Together, they are referred to as "KISA", an acronym that stands for these four words:

Knowledge = what you know
Insight = what you understand
Skills = what you are able to do
Attitude = who you are

Examples of those four kinds of mental tools are (see also Table 1):

Knowledge:
The concept "consequence scope" and "consequence period" (related to competence R1: *Responsibility*)
The Triple P: people, planet, profit (competence S2: *System orientation*)
Linear and non-linear processes (competence F2: *Future orientation*)
Maslow's hierarchy of needs (competence F3: *Future orientation*)

Insight:
You distinguish between facts, assumptions, and opinions (competence E2: *Emotional intelligence*)
You position the system within its context (competence S1: *System orientation*)
You recognize flaws in the fabric and sources of vigor (competence S2: *System orientation*)
You understand the difference between tackling symptoms and removing causes (competence F1: *Future orientation*)

Skills:
Create a stakeholder analysis (competence R1: *Responsibility*)
Listen actively (competence E1: *Emotional intelligence*)
Cooperate in interdisciplinary and transdisciplinary ways (competence E3: *Emotional intelligence*)
Perform a function analysis (competence F3: *Future orientation*)

Attitude:
You feel and show personal responsibility (competence R2: *Responsibility*)
You respect values (competence E1: *Emotional intelligence*)
You think and act integrally and chain oriented (competence S3: *System orientation*)
You think innovatively, creatively, and out of the box (competence F3: *Future orientation*)

If you have all these tools in your repertoire, you possess a well-equipped toolbox to work sustainably. All of them are explained in more detail in the earlier mentioned books offering practical examples of the *RESFIA+D* competences.

9. All the competences of the rainbow

RESFIA+D, as a set of sustainability competences, claims to be *complete*.

This is quite a claim! Is it possible that such a model – *any* model – is complete? Surely there will be people who, immediately after reading such an ambitious claim, will prove it wrong by mentioning a competence missing from the set. How about ethical consciousness, inspiration, leadership, or – if you are Christian – stewardship? In other words, how complete is the model really?

The answer can be given by comparing *competences* with *colors*. Of those, there exist an infinite number. If one mentioned a long series of colors and then claimed *all* of colors were listed, it would not be very hard to point out shades that would still be missing. There would be every chance that Bulgarian rose, Vegas gold, or Harvard crimson were not yet included. Eggplant, mint, or vanilla. Perhaps, the list failed to mention a nameless color that is indicated by its RGB values (red-green-blue), each expressed as a number between 0 and 65,535: This offers a variation of more than 280 million shades. That is a lot, but it is *nothing* compared to the infinity of all colors. No, an enumeration of colors can never be complete.

The same applies to competences for sustainability. Whoever attempts to find more, will be able to express hundreds of them in the English language, and if you think that is still not enough, you can make up your own new words or borrow them from other languages. In short, the quest for completion is at best a hopeless effort and at worst a desperate exercise.

To deal with the enormous variety of colors, people have chosen to give names to a limited number of main colors and to consider the rest as mixtures, blends, or combinations of them. Since this has been done independently throughout many eras and in different cultures, it has rendered a fascinating diversity. Western culture

traditionally distinguishes seven colors of the rainbow, plus black and white. In total, this makes a set of nine:

- Red, orange, yellow, green, blue, indigo, violet, black, white
- However, the Candoshi, a Peruvian tribe, distinguish only eight basic colors (Kay et al. 1997):
- Chobiapi, ptsiyaro, kamachpa, kavabana, tarika, kantsirpi, ponzani, borshi
- It is not easy to translate them into English, but if you try, you get something like: *red, yellow, bright green, greenish blue, purple, black, pale & grey, white.*
- According to Kay et al., the Kwerba, a tribe in Irian Jaya, Indonesia, know even fewer, namely four colors:
- Asiram, nokonum, kainanesesenum, icem
- In English, this is roughly equal to *red, yellow, green & blue & black, white.*
- Knowing only four colors may seem rather primitive. But a hypermodern laser printer does not possess many more, as it is a five-color printer:
- Magenta, yellow, cyan, black, white

For four of those colors, a color printer has separate toner cassettes. The fifth color, white, is produced cleverly by not using each of those four toners simultaneously. How could the Kwerba be primitive? They are hardly second to a printer from the 21st century.

Why are there such huge differences between color schemes? Because every scheme you design will always be a simplification of reality. What you do is cut a continuous color spectrum into a finite set of separate colors. Actually, this is simply wrong, but what are you going to do? If you don't wish to make this mistake, you can never define a color, and so the rainbow is cut into pieces: nine in Europe and North America (if you include black and white), eight with the Candoshi, four with the Kwerba, and all kinds of numbers with hundreds of different cultures.

This dividing of a continuous spectrum into a finite set of separate elements is something we do all the time. Here are some examples from management science.
9 is the number of criteria of the EFQM Excellence Model for quality management (Nuland et al. 1999):

- Leadership, strategy, people, …

8 is the number of fields in *Leary's Rose* (Leary 1957):

- leading, helping, co-operative, …

7 habits are what highly effective people possess, according to Stephen Covey (Covey 1989):

- proactive, begin with the end in mind, first things first, …

6 M's are basic to the *Six Sigma* method for quality management (Tennant 2001):

- machines, methods, materials, …

5 layers together form the hierarchy of Maslow, a model for the needs and motivations of people (Maslow 1954):

- physiological needs, safety, social needs, …

4 steps are what Deming's control cycle (Deming 1986) consists of:

- plan, do, check, act

3 is the number of elements in the Triple P (Serageldin 1996) of sustainable development:

- people, planet, profit

2 basic principles exist according to traditional Chinese philosophy:

- yang, yin

1 is the number of universes we live in:

- reality

Do you really think there are cosmic laws prescribing that a quality cycle consists of precisely four steps as Deming proposed? Of course not, and no doubt Deming realized that, too. Or do you believe, as Covey taught us, that effective leaders possess exactly seven habits? Covey himself does not think so since he "discovered" an eighth habit a few years later (Covey 2004):

- find your voice, in other words: inspire others

What all of these designers of the above models and systems have done is split reality into parts. While doing this, they corrupt reality, but that is *all right* as it provides us with methods to deal with reality effectively.

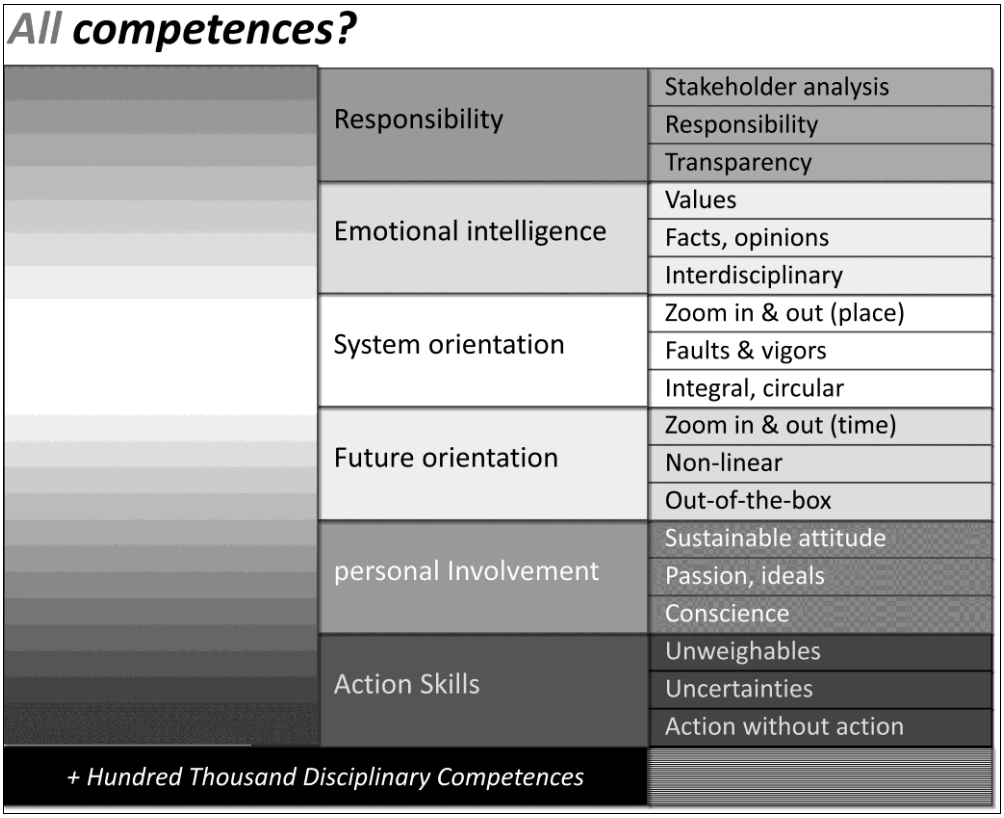
Mathematicians speak of a "cover". The nine criteria of the EFQM model "cover" the wide area of quality management, roughly equal to the way in which a window screen covers an open window: hermetically closed for mosquitoes and

other bugs and thus effective, but not 100% closed, therefore allowing fresh air to enter.

In the same way, the sustainability competences of this book cover the wide range of competences of a sustainable professional. The *RESFIA+D* spectrum (see Figure 2) includes:

- responsibility, emotional intelligence, systems orientation…

Figure 2. A spectrum of a hundred thousand and eighteen competences



Source: Authors' own elaboration.

This is not airtight, but it is effective. If you mention competences that are not literally there, they probably present variations or combinations of competences discussed in the book.

Are you looking for *ethical awareness*? Go to competence I3, dedicated to the *Conscience*. Do you want to find the concept of *inspiration*? Have a look at competence I2 about *Passion, dreams and ideals*. Aside from that, turn to *Innovative, creative, out of the box* in competence F3. You are interested in *stewardship*? Search for *Responsibility* in competences R1 to R3, and you will find related information.

Concerning *leadership*: this concept is considered to be of a different nature, not so much a competence but rather a competence *level*, so you can find it in section 4 of this article, where varying degrees of leadership are explained, ranging from Apprentice (developing) to Master (advanced).

All in all, this means that the "rainbow" of sustainability competences in this book is complete, not in the sense of "airtight", but certainly in the sense of a "cover".

This "cover" principle may immediately be tested by making a comparison between the competences set of *RESFIA+D* and other, recent models. One such model was published by Wiek et al. (2011), who defined a set of five competences: Systems-thinking competence; Anticipatory competence; Normative competence; Strategic competence; Interpersonal competence.

This model was extended and slightly adapted to a set of seven competences by Dentoni et al. (2012), which was applied by Lans et al. (2014) and Ploum et al. (2018). Their seven competences are: Systems-thinking competence; Embracing diversity and interdisciplinarity; Foresighted thinking; Normative competence; Action competence; Interpersonal competence; Strategic management. Table 5 compares the two sets with the *RESFIA+D* set.

It is evident that all competences defined by Wiek et al. (2011) and by Dentoni et al. (2012) can easily positioned within the *RESFIA+D* model. Wiek et al. did not define equivalents of *RESFIA+D*'s *Responsibility* and *Emotional Intelligence*. Dentoni et al. added Embracing diversity and interdisciplinarity which comes close to *Emotional Intelligence*, especially E1 and E3, respectively. Both Wiek et al. and Dentoni et al. don't explicitly define a competence which is comparable to *Responsibility*, although Dentoni et al. indirectly mention it by writing about "responsible action".

Table 5. Illustration of the "cover" principle

Roorda (2010): RESFIA+D	Wiek et al. (2011)	Dentoni et al. (2012)
Responsibility		(Action competence)
Emotional Intelligence (e.g. E1. Recognise and respect his or her own values and those of other people and cultures; and E3. Cooperate on an interdisciplinary and transdisciplinary basis)		Embracing diversity and interdisciplinarity
Systems Orientation	Systems-thinking competence	Systems-thinking competence
Future Orientation	Anticipatory competence	Foresighted thinking
personal Involvement	Interpersonal competence; Normative competence	Interpersonal competence; Normative competence
Action Skills	Strategic competence	Strategic management; Action competence

More such comparisons can be made, e.g. with sets of competences designed by Kearins and Springett (2003), by Sipos et al. (2008), and by Sterling and Thomas (2006). As an example, a comparison is made here with Sipos et al. (2008). They don't exactly define a set of competences, they rather define – as they call it – "Transformative sustainability learning" (TSL). For this purpose, they propose a list of 18 TSL characteristics in their Table 2, divided into three groups, "*Head*", "*Hands*" and "*Heart*":

> *Head:* Cognitive engagement; transdisciplinary curriculum; critical thinking; systems thinking; understanding of sustainability; understanding of global citizenship.
>
> *Hands: Personal:* Experiential learning; applied learning. *Classroom:* democratic and participatory learning environment; conflict resolution. *Community:* collaborative; service learning.
>
> *Heart:* Empowering; creative; fun; values-focused thinking; inclusive; place-based.

All or most TSL characteristics can be interpreted as competences, and next be related to the 6 main or the 18 detailed competences of *RESFIA+D*. This is done in Table 6, in which *RESFIA+D* is shown in more detail than in Table 5, because TSL also offers more details.

Table 6. Further illustration of the "cover" principle: comparison between RESFIA+D and TSL

Roorda (2010): RESFIA+D	Sipos et al. (2008): TSL
Responsibility	Service learning
R1. Stakeholder approach	Inclusive
R2. Personal responsibility	Experiential learning
R3. Accountability	Democratic and participatory; global citizenship
Emotional Intelligence	
E1. Values and cultures	Values-focused; inclusive; global citizenship
E2. Facts vs. assumptions, opinions	Critical thinking
E3. Inter-, transdisciplinary	Transdisciplinary curriculum; collaborative
Systems Orientation	Systems thinking; applied learning
S1. Analytic vs. holistic	
S2. Flaws vs. vigors	
S3. Integral thinking	
Future Orientation	
F1. Short-term vs. long-term	
F2. Linear vs. non-linear	
F3. Innovative, creative	Creative

Table 6. Cont. …

personal Involvement	Cognitive engagement; place-based
I1. Sustainable attitude	Sustainability
I2. Passion	Fun
I3. Conscience	Service learning
Action Skills	
A1. Unweighabilities	Conflict resolution
A2. Uncertainties	
A3. Action without action	Conflict resolution

As an illustration of the comparison of Table 6, the description of one of the elements of Sipos et al. is cited. They describe "Service learning" as: "*Helps foster civic responsibility by requiring participants to engage in service that meets a need in a local community, including structured time for participants to reflect on their service experience*". This explains why, in Table 6, "service learning" is matched with *RESFIA+D*'s "Responsibility" and also with "Conscience": they are no exact matches, but they are comparable, based on the "cover" principle.

Some similarities between the two models are only partial; as an example, "Passion" is about much more than just "Fun". For example, visiting a theme park may be fun; designing one, though, takes passion. Equally, listening to music is fun (and perhaps also passion); composing a song, however, takes passion.

All in all, just like the model by Dentoni et al., the model by Sipos et al. also has clear similarities to *RESFIA+D*, with a few exceptions: whereas Dentoni et al. mostly lack "Responsibility" (which is explicitly present in Sipos et al.), Sipos et al. don't mention anything like "Future orientation" (which is explicitly present in Dentoni et al.), although one might argue that this is an implicit aspect of "Sustainability".

10. Concluding remarks

In a next article by the authors of this article, which can be found in this journal, called "The Seven Sustainability Competences according to the RESFIA+D Model. Part B: Practical Experiences", some examples will be described of the application of RESFIA+D in real life. This next article will end with some concluding remarks concerning the theoretical and practical aspects of *RESFIA+D*.

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