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Chapter 5

Grading Intellectual Work Output by Fractional Approach to Excellence: A Score Sheet for Every Activity

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Additional information is available at the end of the chapter

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Abstract

This communication relates experiences with peer evaluation and self-evaluation of individual and collective professional activities. Grading of intellectual work output proceeds by means of score sheets. A score sheet is a set of requirements for reaching a standard of performance. It assesses the quality of performance as fractional approach to the standard by dividing the fulfilled requirements by their total number. Individuals and organizations establish their standards, which represent their values, according to their ambitions of excellence, and monitor the approach with the score sheets. Examples of experiences available so far refer to measuring the qualities of technical reports and essays, of oral presentations, of teacher performance, of environmental performance of schools, of marketing success of horticultural produce, of urban sustainability, and of life at old age. For each of the experiences, the text presents and discusses the pertinent score sheet, which indirectly measures a value by showing the approach to expected performance or behavior. Congruence exists if an organization and its members strive for the same standard of performance.

Keywords: collective values, congruence of individual and organizational values, degrees of excellence, fractions of excellence, grading systems, intellectual work, measurement of values, peer evaluation, personal values, potential of performance, score sheets, self-evaluation, service quality assessment, service standards

1. Introduction

The dictionary defines quality as the degree of excellence of something. This definition fatally implies fractions. On the road to excellence, a performer climbs various steps. If he or she reaches the target, the fraction of excellence becomes 1.0, and the performer has attained his

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or her maximum potential. On the scale of fractions, the quality of any work output is situated somewhere between zero and one. This is its degree of excellence. The evaluation of the most diverse items obeys this procedure, from the Human Development Index (HDI) all the way to a research report. Now, the notion of the index appears. An index is a number giving the magnitude of a phenomenon in terms of a standard. This returns the argument to the fraction. The standard is 1.0, and the magnitude of the phenomenon again is somewhere between zero and one. There are two methods to assess the magnitude of a phenomenon, a subjective evaluation and an objective evaluation. Examples of the subjective evaluation are the Likert scale and the Servqual scale. They are multiple-choice questionnaires with weighed answers. They gauge opinions or attitudes of the customer universe of an enterprise to assess customer satisfaction with its services [1–4]. The results take the form of words, not numbers. A customer may rate a service as poor, fair, or good. The method is reactive. It evaluates the work of others after completion. The triage theory of grading reported by [5] also falls into this category. It states that a phenomenon can only be good, bad, or in-between.

The objective method of grading the magnitude of a phenomenon uses numbers, specifically fractions. Consequently, it is more precise than the subjective method. It is the object of this report. Instead of categorizing a piece of intellectual work as good or poor, it defines a standard of excellence and asks how closely the piece of work comes to meeting it. The standard takes the form of a score sheet that lists all requirements for excellence of the given piece of work. The more items there are in the list, the more reliable the evaluation is. The performer or the judge ticks off the requirements met and divides their number by the sum of items in the list. The result is a simple and precise fraction. This method is proactive in the sense that it allows for self-evaluation and inspires iteration. A performer can set his or her own standards of excellence and then strive to meet them.

Another difference between the methods refers to nomenclature. Is the target excellence or perfection? [6] provides definitions of those terms for the purpose of evaluation or grading. "Perfection pursues an external standard, a universal standard, or at least somebody else's standard. Excellence measures the achievement of one's own potential." With the objective method, a person can advance professionally by setting high standards of excellence for himself or herself and by facing the challenge of reaching his or her maximum potential. Contrary to perfection, the potential of excellence varies from person to person or from group to group.

Quality may refer to the performance of institutions or individuals. Many international bodies study and promote institutional quality. The International Academy for Quality (IAQ) pursues the "mission of adapting principles and methods to improve performance for the benefit of society, specifically to improve corporate governance worldwide." It works through task forces in different disciplines [7]. The International Organization for Standardization (ISO) pursues the "mission of developing and publishing international standards," which are the targets of quality that any institution strives to reach. As an example, the ISO 9000 series of norms "sets out the requirements of quality management systems" [8]. The United Nations Development Program (UNDP) maintains the account of the Human Development Index (HDI), which assigns a dynamic index or a fraction to each country representing its performance quality with

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respect to life expectance, knowledge, and living standard [9]. [10, 11] Confront individual with group performance and determine to what extent the sum total of collective achievement outperforms the individual achievement. The notion of approach to excellence in the teaching context is present in studies by [12–15]. These references are concerned with what students need to learn and how they can apply their acquired knowledge in the competitive work environment. In this context, the present report anticipates the outcome by directly evaluating the performance of the teacher with a teaching score sheet.

Quality of performance relates to scales of value in the sense that top performance is the value target of organizations, institutions, or individuals for all activities they exercise. Score sheets do not measure values directly. They provide targets of performance and behavior and measure the approach to those targets with precise fractions. Individuals and groups reveal their values in their behavior. If they strive for top performance, then they practice this value. If they strive for fairness of evaluations, then they practice this value. Score sheets are the tools for monitoring the success of the endeavor.

2. Objective

The objective of this communication is to discuss personal experience with peer evaluation and self-evaluation of typical professional activities using score sheets. The score sheets define excellent performance in terms of a certain number of specific items, such that the quality of performance becomes a fraction of the achievement of excellence. The study pretends to inspire persons and groups to establish their own standards of excellence for every intellectual activity they pursue and create the habit of checking or grading their performance.

3. Method

During his professional career, this author constantly came across situations where he needed to evaluate individual or collective activities, without having a reliable standard against which to work. The index method for evaluating institutional or organizational performance was of no avail. The social performance of a nation or the governance of a corporation did not supply evaluation schemes for individual everyday tasks. Consequently, he set out to develop the score sheet method. It consists of preparing a predetermined list of requirements for reaching target performance in every activity considered. The number of requirements met divided by the total number of requirements provides the quality or the index of performance. The score sheets exist prior to the execution of any assignment or activity. Thus, the evaluation, including self-evaluation, becomes reasonably objective and repeatable. The most interesting component of the method is the possibility of iteration. A person can prepare a report or a presentation, test it against the score sheet, improve it, test it again, and only deliver it when he or she judges the quality satisfactory. There are no surprises. This concept of iteration also is at the heart of machine grading. A person writes an essay and submits it to the computer for grading. According to the grade received, he

or she rewrites the essay and submits it again until satisfied [16]. The first score sheets developed and discussed here refer to typical activities of the learning context where they measure communication skills, namely, technical reports, general written assignments (essays) of students, oral presentations, and teacher performance. With time and experience, they extrapolated to institutional and social contexts and found use for grading the environmental performance of schools, the marketing success of horticultural produce, and the sustainability of cities. The author even discovered a surprising horizon for the method by applying it to assessing the quality of life after retirement. The method responds directly to claims of [17] who dismisses multiple-choice questions and formal final exams in the learning context as inadequate. He predicts, "We are on the brink of a future where university assessment follows a set of pre-established algorithms, and thus students will reclaim assessment as a learning tool." [18, 19] advocate similar procedures. Instead of algorithms, they use the term scoring rubrics to refer to a set of requirements for each intellectual task. The grade is simply the fraction of rubrics met by the candidate.

In his teaching activities, this author abandoned the classical final exam routine 30 years ago and began working with the score sheet method, which he considers the algorithm or scoring rubric that students and professionals can use for self-evaluation of their work. The evaluation at school mimics the evaluation of professionals at work. It is progressive over fixed time spans. The grades for all individual tasks accumulate during those time spans, such that a person knows his or her total grade at any moment. There is no need for one final task to evaluate the person's performance. Summing up, the method of objective progressive evaluation through scoring rubrics consists of the following steps. Decide which activity or task to evaluate. Define the target in terms of the maximum degree of excellence expected. Compose a set of rubrics or requirements that lead to excellence, the more the better. This set is the score sheet. Obtain agreement on the score sheet from all stakeholders, evaluators and evaluated. Apply the score sheet to assess the quality of each task or activity by dividing the number of requirements fulfilled by the total number in the set. This assessment may be iterative in order to improve the result of a specific task before release. It may also be repetitive in order to determine progress over time in a specific activity. It is proactive because as a learning tool it inspires people to meet their intellectual potential. Organizations pursue exactly this value: inspire their members to meet their intellectual potential for the benefit of the organization. How do they determine whether this value is in fact operational? They use score sheets.

4. Results

The method follows this author's conviction that it is easier to define perfection or excellence, than it is to define quality. Consequently, the first step always is to define excellence for any activity or task on the horizon. The second step is to provide the metrics for fractional approximation of excellence and thus measure quality as the fraction of excellence achieved [20]. With this philosophy in mind, the author developed score sheets (or metrics or scoring rubrics) for diverse situations, tested them through evaluations of performance, and improved them where necessary. The situations covered so far follow below. The score sheets are dynamic in the sense that any person, judge or performer, may adapt them to his or her specific application by modifying the list of metrics.

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4.1. Technical reports

The necessity of a technical report arises in diverse working environments, such as industry, research, schooling, and consulting. Reports may contain text, figures, calculations, appendices, and nomenclature. The author's score sheet applies specifically to the university context where students have to prepare reports for term projects or laboratory experiments. It seeks to attend to the following teaching philosophy. Report writing is part of engineering apprenticeship. An engineer communicates his or her work performance through technical reports. In the industrial context, the engineer's scale of values asks for excellent reports. In the university context, the teacher coaches students in report writing. The evaluation of reports is objective and repeatable (a report receives the same mark today or next month from any grader). Flawless composition is as important as flawless calculations. The score sheet with explanations of use and a sample numerical result is available from [21].

It contains six sections with varying numbers of rubrics as follows:

- Work efficiency (7 rubrics)
- Quality of presentation (10 rubrics)
- Quality of editing (15 rubrics)
- Technical level (14 rubrics)
- Quality of calculations (14 rubrics)
- Quality of drawings and tables (11 rubrics)

Each section receives a fractional or percentage grade according to the number of rubrics attended, and the total grade is the average of all six fractions or percentages. The section on work efficiency is specific to the learning environment. It is probably redundant in a professional context. It serves the author to transmit to students the understanding that meeting deadlines is an intrinsic part of professional work. Every time he or she misses a deadline, a performer accumulates a negative concept in his or her job evaluation program. The score sheet under consideration mimics this fact. If he or she delivers the report on an arbitrary date, he or she accumulates zeros on the first four rubrics and only starts punctuating on the fifth one.

In addition, the grader may establish a cutoff mark necessary for acceptance. He or she then returns the report for rewriting if it falls short of the cutoff mark. In the teaching context, this is a powerful stimulation. It tells the student: You can do much better, please do. The section on work efficiency addresses this procedure in items 6 and 7. If the report is not accepted for grading after two trials, item 6 is zeroed out. There are a few specific items in the score sheet that lead to instantaneous rejection of the report, and the performer has no choice but to agree. Examples: The handwriting is illegible or the typing is negligent. Coverage of subject matter is below 60%. There are errors of arithmetic. More than 5% of the sentences contain infractions of grammar. This refers to the author's specific application. Any person or organization can adapt the sheet to their needs by modifying the rubrics. As a result, the score sheet objectively defines the expectations placed on written reports in diverse contexts. There are no surprises.

There are no opinions. There are only fractions, precise fractions. Newcomers simply receive the score sheet and study it. They soon learn how to iterate. There is no need for indoctrination.

4.2. Essays

The requirement of writing an essay is omnipresent in daily professional life. It goes all the way from expressing a point of view to written exams of any kind. In every case, the essay is a professional communication tool. The author needed a score sheet for grading essays handed in by graduate students as part of a course requirement. He found the answer in the Brazilian National High School Examination run by the Ministry of Education. Various authors have reproduced and commented on the grading scheme for the essays applied in those exams [22, 23]. From the former reference, the author extracted the essence of the grading scheme, modified it to suit his context, transformed it into a score sheet, and translated it [24]. The idea of the evaluation is to break it down into five expectations of proficiency that, respectively, refer to the following aspects:

- Domination of the norms of the written language
- Comprehension of the scope of the proposed title
- Selection and organization of information, facts, and opinions to support the argumentation
- Mechanisms for the construction of arguments
- Valid conclusions derived from the arguments

For each proficiency, the score sheet provides five possible choices of grade according to the degree of attainment of excellence. The second proficiency serves as illustration.

Proficiency 2—Comprehension of the scope of the proposed title.

Grade 0—Does not comprehend or attend to the given title.

Grade 1—Develops the topic tangentially. The text presents some characteristics of argumentation.

Grade 2—Develops the topic reasonably from considerations of common sense and with references to the title.

Grade 3—Develops the topic well with predictable arguments and indications of authorship.

Grade 4—Develops the topic very well with a personal and productive text and good argumentations.

The sum of the partial grades divided by a perfect total score delivers the quality of the essay in the form of a fraction or percentage. The perfect total score is 100% or $5 \times 4 = 20$. Experience shows that this method allows a grader to evaluate many essays within a reasonable time and arrive at reproducible grades. The rubrics are open to discussion and modification to suit specific applications. This score sheet is a learning tool. It allows students and professionals to adapt their style of writing to the demands of proficiency and iterate. As was the case with technical reports, the expectations are clear and do not hide surprises. There are fractions, precise fractions.

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4.3. Oral presentations

Very early in his career, this author perceived the need to prepare oral presentations of all kinds thoroughly. An audience does not forgive poor performance resulting from improvisation. Apart from general advice on visual aids and the speaker's behavior, the idea of grading comes into play again. What is the standard for an excellent presentation, and how close to the standard does any speaker get? How well does he or she communicate with the audience? The score sheet shown in Ref. [25] answers this question.

As was the case with written reports, it stimulates iteration. Practice runs are never graded, but in the public presentation, there is no room for excuses. The score sheet serves both the speaker and the grader. In the academic context, this author evaluates his students by their written and oral presentations. This means that they have to hand in a written project report and defend it orally in front of their peers. The score sheets guide them through those tasks, and they may practice as much as they please. Following the philosophy of teaching stated earlier, the peers do the grading on the score sheet supplied. It is a learning tool. There are no surprises and no opinions. In any organization, if achieving excellence were a value, the score sheet could provide guidance for preparing excellent presentations. It evaluates the three basic parts of the task, namely, content, preparation, and delivery.

The part on content expresses what the audience expects in terms of relevance, organization, and quality of argument. There are 15 requirements in this section. The section on preparation focuses on the use of allotted time, the quality of visual aids, and the physical infrastructure. It contains 17 requirements for meeting the standard. The way the speaker uses his or her time is the best clue to knowing whether he or she practiced the presentation prior to delivery. A speaker who asks the chairperson how much time is left, or who exceeds the time limit without noticing it, obviously has not prepared the presentation. The score on delivery grades the quality of discourse and the speaker's behavior. The standard for this section contains 13 requirements. The quality of discourse is another clue to detecting prior practice runs. In a practiced talk, there is fluent continuous speech without breaks or superfluous interjections. The total number of requirements is 45. The grader simply ticks off those that the speaker fulfills and divides them by 45 to produce the score, which represents the fractional attainment of excellence. This particular score sheet is universal. There is not much room for improvements or modifications. Ever since he created it, this author has become very critical of presentations he witnesses at scientific conferences. He mentally grades them, and the results are not always excellent. He himself has adopted the habit of iteration. He arrives at conferences with a high level of confidence, because he knows exactly what to say and stays exactly within the allotted speaking time. This is an invitation to the reader to follow similar procedures and increase his or her professional satisfaction. By way of an extreme situation that arose at a conference, here is what the author learned from the score sheet. Item III B 4 requires the speaker to be visible to all listeners. At the said conference, the speakers' podium was so high that they practically disappeared behind it. This author knew exactly what to do. He grabbed the microphone and stood beside the podium while speaking. The visual contact was excellent, and nobody objected. Why did none of the other speakers do this? They did not know about the score sheet, which provides a competitive advantage. Another trick is hidden in item III A 3, which

requires the speaker's voice volume to be adequate for everybody to hear. The author has seen speakers who fail to speak into the microphone and have to be reminded of this by the chairperson, clearly a competitive disadvantage.

4.4. Teacher performance

This is a polemic subject. This author has encountered many methods of evaluating teachers in the university context. They go all the way from simply asking an opinion of students to checking the assiduity of the teacher. None of them is objective in terms of defining a performance standard and measuring the approach to it. Consequently, this author set out to prepare his own score sheet. It establishes a standard of excellence in terms of 44 requirements, subdivided into eight topics, which are explained in Ref. [26] as:

- Relevance (8 rubrics)
- Pertinence (5 rubrics)
- Availability (4 rubrics)
- Use of teaching aids (4 rubrics)
- Effectiveness (8 rubrics)
- Efficiency (5 rubrics)
- Didactics (6 rubrics)
- Creativity (4 rubrics)

With this score sheet, the author has set his standard of excellence, which he strives to meet. It has been a valuable guide over many years of teaching. At the end of each course, all students answer the score sheet, and the teacher calculates his or her teaching quality by dividing the number of requirements fulfilled by 44. The rubrics are flexible. Any teacher may modify them to suit his or her personal ambition or the circumstances and context of the teaching activity. Although it is not its main purpose, the score sheet also allows the teacher to test the students. Here are some examples of lack of seriousness. A student who misses various classes is not in a position to rate the teacher's assiduity. If the teacher is convinced that he or she covered the program, there is no way to accept a zero mark from a student on that question. This author does not admit anonymity. Students have to identify themselves on the sheet in order to permit discussion. They fill in the sheet at the end of the term when they already know their marks. This avoids fear of reprehension. In terms of grading philosophy, this approach differs from that used in the references mentioned at the end of "Introduction." They measure the success of teaching indirectly by asking the students what they have learned and how they apply their knowledge. The teaching score sheet is a direct method. It establishes teaching procedures that induce relevant learning on the part of the students. Here are a few examples. In Section 1 on relevance, the first question is, "Were you stimulated to construct a scale of values for your life?" The fourth question is, "Did you learn how to argument objectively and defend convictions?" In Section 8 on creativeness,

the second question is, "Were you stimulated to learn to think?" All those are desirable outcomes of the learning experience. The score sheet tells the teacher that he or she needs to meet them and thus anticipates the outcome. It is a proactive approach to teaching quality.

In this particular application, the assessment of quality forms a congruence of what the labor market expects, what the institution promises, and what the teacher delivers.

4.5. Environmental performance of schools

Metrics for school performance are usually limited to academic achievement. In an attempt to extend the scope of the evaluation, the author worked with several schools on environmental impacts. Schools exert impacts on the municipal infrastructure, but they remain hidden. Staff and students are not conscious of them and, thus, do not consider measuring or analyzing them. The author's research with the schools discovered a surprising number of impacts and engaged the communities in measuring them. The list contains the following items: solid waste production and separation, water consumption, sewage production, energy consumption, noise levels, permeable soil areas, food consumption, traffic density at the gate, and rain-harvesting possibilities. The research divided the list into positive and negative impacts. Positive impacts aspire to a maximum. Negative impacts aspire to a minimum. Waste sorting and rain harvesting produce positive impacts. Energy consumption and traffic density produce negative impacts. Ref. [27] contains the complete evaluation.

The procedure for developing the score sheet is as follows. The community measures all impacts and produces a list. This list will contain many different units, such as kg/day, liters/person, kwh/month, square meters, and number of vehicles. In order to provide a meaningful basis for the impacts in different schools with different populations, it is convenient to state all measurements on a "per person" basis. In order to allow for comparisons, the concept of fractions comes in. The team establishes a target for each impact and finds the fraction of success by dividing the measurement by the target. The target represents the state of excellence. The fraction represents the approach. The average of all fractions defines the performance index. The following example illustrates:

1. Measured values:
    a. Solid waste sorting ratio 0.413 sorted waste/total waste
    b. Solid waste production 0.113 kg/(person×day)
    c. Energy consumption 0.679 kWh/(person×day)
    d. Water consumption 50 l/(person×day)
    e. Highest existing noise 65 db
2. Voluntary reference values agreed upon by the community:
    a. Solid waste sorting ratio 0.670 sorted waste/total waste
    b. Solid waste production 0.100 kg/(person×day)

c. Energy consumption 0.550 kWh/(person×day)

d. Water consumption 40 l/(person×day)

e. Highest existing noise 55 db

3. Present environmental performance index:

a. Solid waste sorting index 0.413/0.670 = 0.616

b. Waste production index 0.100/0.113 = 0.885

c. Energy consumption index 0.550/0.679 = 0.810

d. Water consumption index 40/50 = 0.800

e. Noise index 55/65 = 0.846

f. Overall performance index 3.957/5 = 0.791

The targets may be fixed or mobile. The city administration can fix a target. The school community can agree on a voluntary target to test its ambitions of performance. This would be a mobile target, subject to periodic revision. In any case, the performance index shows the community the result of its efforts. The procedure serves two purposes. It allows for comparisons and competition with other schools, and it allows any school community to compete with itself by watching its performance index. The items pertaining to the performance index represent the score sheet. The index is a fraction of excellence or success. It is a learning tool. It inspires the community, especially the students, to take interest in their environmental impacts. The score sheet is objective. There are no surprises. There are fractions, precise fractions. It is proactive. It inquires students how to lower their noise level and their water consumption. The community experiences satisfaction when it increases its performance index. The involvement creates a sense of pertinence. Students become proud of "their" school. There is congruence of individual and organizational values.

4.6. Marketing of horticultural produce

As a further extrapolation of the score sheet method, this research developed a scoring guide that can assist commercial establishments and households in evaluating and mitigating the loss potential for fruit and vegetables within their operations. The scoring model separately addresses losses related to products and losses related to establishments. The score for the products evaluates the activities of classification, packaging, transport, and storage. A graphical representation shows the empirical relationship between the scores and the expected losses of produce. A perfect score of 40 (4 × 10) implies zero loss [28, 29]. The following example illustrates the scoring procedure for the classification step.

Classification is the activity of sorting produce according to the four parameters: variety, size, color, and appearance. Scoring is as follows:

- 10 points—The produce displayed for sale shows all the characteristics of complete classification according to the four parameters indicated above, and the activity is executed by trained personnel or by shop owners.

- 8 points—The produce is classified according to two of the four parameters by trained personnel.
- 6 points—The produce is classified according to two of the four parameters by untrained personnel.
- 4 points—The produce is classified according to one of the four parameters by trained personnel.
- 2 points—The produce is classified according to one of the four parameters by untrained personnel.
- 0 points—There is no classification.

The score for the establishments assigns values to the management functions of maintenance of premises, professional qualifications of personnel, quality demands on suppliers, purchase programming, and direct supervision of operations. A graphical representation shows the empirical relationship between the scores and the expected losses of produce. A perfect score of 10 (5 × 10/5) implies zero loss. The score sheet pinpoints the weak components in the system and thus assists in correcting them. The following example illustrates the scoring procedure for the maintenance rubric.

Maintenance of premises. This item refers to the conditions of hygiene and to the attractiveness of the space used to store and display the produce:

- 10 points—The site is air conditioned or sufficiently ventilated. Produce is stored or displayed in clean disinfected containers without stacking.
- 5 points—The site is air conditioned or ventilated. Containers are not clean or disinfected. There is no stacking.
- 0 points—The site is inadequate for storing or displaying food items from the points of view of hygiene, temperature, and stacking.

This example applies directly to commercial organizations and storeowners, who pursue as a value to suffer zero losses of produce in their operations. The score sheets help them measure the success. There is congruence if all employees subscribe to this same value and behave accordingly.

4.7. Urban sustainability

This is the most ambitious application of the score sheet method tackled so far. Up to now, sustainable growth or development has not been uniquely quantified for municipalities. They have remained abstract terms that do not help individual citizens or organized society to set goals for their environmental behavior and contribution. A review paper by [30] relates 411 urban sustainability indicators, grouped into the dimensions of society, environment, economy, and institution. There is a unit of measurement for each indicator, but there is no target value for calculating the fractional approach. The authors admit that the selection of indicators is subjective and recommend the use of "widely recognized indicators" for local applications. They present the pressure-state-response (PSR) concept as most adequate for identifying a situation of strong urban sustainability.

This author's study [31] precedes that of [30] by 11 years, but their review does not cite it. It discusses the establishment of quantitative and widely recognized indicators of sustainability for the conception of long-term municipal policies concerning the environment. The set contains all components of the PSR system on a modest scale. The pressure component is present in the form of demands for public transportation and waste management. The state component is present in the form of passenger satisfaction and waste collection. The response component is present in the form of expedience of travel and performing educational institutions. The sustainability indicators are quantified to a reasonable extent and relate to timeframes of 8 years for acceptance and two generations for targeting. In this context, urban sustainable development represents a series of provisions originating from public administration and organized society that will move all the indicators of a given unsustainable city as close as possible to the expected targets within the chosen timeframe. As always, the success of approach is the fraction of the present value divided by the target or standard. The following list of 12 basic municipal sustainability indicators defines the scope:

- Population growth is under control.
- Existence of a high-quality public transportation system.
- Landfill diversion of solid waste in excess of 70%.
- All liquid effluents are treated.
- Air quality is monitored.
- Fresh water demand is monitored and controlled.
- The public education system reports high teacher and student satisfaction.
- Public health care is accessible and of high quality.
- Citizens are socially and politically active.
- Energy supply and demand are monitored and controlled.
- Existence of public recreation areas.
- Rivers and creeks are under official protection.

The standard aim is the satisfaction of all 12 demands. For each demand, the measurement divided by the target supplies the approach.

As an example, the measurement of progress for liquid effluent handling is as follows:

Indicator	Present value (%)	Target (%)	Fractional approach
Fraction treated	60	100	60/100
Collection network	78	100	78/100
Storm water separation	50	100	50/100
Industrial self-treatment	70	100	70/100
Average success fraction			64.5/100

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The success fraction tells the stakeholders what has been achieved and what remains to be done. The numbers are plain and clear. They induce planning of actions for advancement.

The procedure illustrates the philosophy behind the score sheet method. It suggests to municipal administrations what to measure and how to document progress. It follows the idea that sustainable development is a process, not an outcome.

4.8. Life quality at old age

This is the latest entry into the list of score sheets. The author constructed it from his own experience and input from others. There are 13 succinct recommendations for a healthy life at old age [32].

The idea is to tick off the recommendations accepted and practiced and divide their number by 13 to know the score. It works. It is the secret of the author's permanent good spirits. His score is constant over time at 100%. This particular sheet illustrates the universality of the method. The most unexpected situations qualify for measurement.

5. Discussion

The eight score sheets presented here transmit the general philosophy behind the method. They illustrate the definition of excellence for various daily activities in terms of a list of requirements or expectations. The lists are open-ended. Every person or organization may select the requirements for excellence according to their own ambitions. The common point resides in the measurement of success in the quest for achieving excellence. The lists are objective and quantitative. The number of requirements met divided by the total always produces a fraction, which expresses the approach to excellence. The term excellence in this context reflects the realization of a person's own potential. In the case of competition with others, where an outside entity establishes the targets, the terms standard and perfection are more appropriate. In any case, the score sheet method is a pragmatic guide for any person or organization to define their targets and measure their success. Improved performance leads to improved satisfaction. The score sheet is a simple grading system for evaluating the performance of others as well as for self-evaluation. Once all stakeholders agree on the targets and rubrics, everybody can mentally grade the performance at all stages, identify faults, and correct them. In any organization, expectations of individual performance are congruent with existing collective performance. The score sheets both measure and verify this congruence. As an example, the exercise of fairness may be a value within an organization. It is impossible to measure fairness directly, but if a unique score sheet grades the performance of all employees in a specific task, there is no room for opinions or subjective evaluations. Fairness is guaranteed.

Especially in the case of individual assignments, such as oral presentations or reports, excellence requires communication skills that are acquired by training. The method invites iteration. Every performer guards his or her secret. He or she does not tell the audience or the grader how many times he or she practiced at home. The audience only acknowledges the perfect presentation.

The author has successfully extrapolated the method from individual assignments to the performance of communities or organizations. This confirms the relevance of the grading philosophy behind the method, namely, that excellence and quality may be measured as the achieved fractions of a standard or target. The examples presented refer to environmental performance of schools and cities and to the marketing performance of vegetable dealers. The score sheets presented for those applications derive from this author's specific experience and research. They are open to discussion by the respective organizations.

In the case of schools, the score sheets are learning tools. They induce the communities to perform and interpret measurements. This is essentially an extracurricular activity, but nothing prevents the school administrations from using the practical experience within the course syllabus of certain subjects. The score sheets represent a language by which schools may communicate with each other and compare their respective performances. Students and staff develop their individual values from the set of rubrics they established for defining the values pursued by the school.

In the case of horticultural produce, the score sheets are guides for all stakeholders, be they wholesalers, retailers, or households. The graphical representations of the collected data clearly show the obvious target for all operations, namely, full marks corresponding to zero losses. The rubrics are simple requirements that allow the stakeholders to check their performance constantly. In the case of urban sustainability, the score sheets represent policy targets for municipal administrations. As the timeframes considered in the example exceed the tenure periods of elected officials, the challenge consists of creating permanent policies and procedures for the achievement of sustainability. The rubrics selected to measure progress toward sustainability are the most obvious items to the pragmatic beholder. Some of them require further refinement in any specific context in order to target the progress in time by means of numbers. As a city is a much larger community than a school or a horticultural supply chain, progress on the score sheets involves a tremendous effort of communication. This is the most demanding outcome of the grading system. The city administration needs to provide information and instructions to the population on how to reach the target. Here are some examples. What do all stakeholders have to do in order to achieve 70% landfill diversion of solid waste? What do all stakeholders have to do in order to maintain water consumption within the limits of supply? Simply telling citizens to separate their waste at the source and to reduce their water consumption will not suffice. The score sheet implicitly obliges the administration to establish procedures, communicate them, verify the compliance, inform unconformities, improve operations, communicate progress, and constantly disseminate information about the approach to the target. The challenge consists of reaching congruence of the citizens' behavior and the administrative expectations. Admittedly, in this case, the score sheet is only the start of the procedure. The execution is beyond the scope of this communication. This application of the fractional grading system is the most optimistic and far-reaching outcome of the score sheet method. Only practical experience will judge its effectiveness.

6. Conclusions

The study presented score sheets for eight different individual or collective technical activities. The philosophy behind the score sheets states that individuals or groups define a standard for the

quality of their performance. Then, they describe the standard in terms of a set of requirements. This set is the score sheet. It allows for peer evaluation and self-evaluation of an activity. Grading proceeds by determining the fraction of requirements fulfilled and is objective and reproducible. The score sheet exists prior to the execution of any activity and thus induces iteration until the performance becomes satisfactory. Any individual or group can adapt the method to any professional activity by selecting the pertinent requirements to fulfill their standard of excellence. The method is a reliable guide to satisfactory professional performance. The participation of individual members of an organization in the definition of the collective performance standard produces the required congruence for success. The author invites readers to apply the method to activities of their daily professional life and thus multiply the examples described in this communication. The particular application to urban sustainability is a futuristic step that represents the next challenge to this research. It pretends to test its relevance on a larger scale.

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