
# NextFood Sustainability Impact Framework

WP5 Quality assured knowledge transfer

EUROPEAN UNION

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# 1 Introduction

Existing frameworks for evaluating impact resulting from agri-food and forestry research provide little incentive for interactive innovation. So there is a need for devising alternative ways of reviewing and measuring performance in this context. In response to this need, the NextFood project has, as one of its objectives, to develop a framework which will assess: 1) the various effects of practice-oriented research in the agri-food and forestry sectors; 2) the processes of interactive innovation in this context; and 3) their positioning in relation to use and impact. The result is presented in this report. The framework generates a sustainability impact index relating to impact aspects on multiple levels. It resonates with NextFood's "action learning strategy" (Lenaerts et al 2019), in considering multi-actor involvement and action-oriented features, as well as includes practice abstracts as a component of the impact work itself. This preliminary framework will undergo a pilot testing and evaluation in the later phases of the NextFood project, delivering a ready-to-use framework in 2022.

This document is organized as follows. The next section presents a literature review, listing the main theories and models used in impact evaluation, and concludes with a summary of the main insights in this context relevant for the NextFood framework. The section following shows the empirical research done within the scope of the NextFood project pertaining to the framework in the form of expert reflections on sustainability impact evaluation. A separate next section combines the insights from the preceding literature review and empirical materials, and specifies how they constitute a basis for the framework. The framework is presented in the following section, describing its structural and procedural components and notes on the role of practice abstracts in it. The final section presents the main conclusions, including a statement of key challenges and next steps within the NextFood project concerning the framework – pilot tests and further refining.

# 2 Literature Review

As a first step towards developing the NextFood framework, we did a literature review of state-of-the-art models concerning impact evaluation in the agri-food and forestry sectors. We did this in two consecutive stages. The first spanned a three-month period, from March to June 2018, and resulted in a published primary literature review.[1] The second stage spanned a two-month period, August and September 2019, and resulted in a complementary, secondary literature review with Håkan Jönsson and Ivanche Dimitrievski as the authors. The next two sections present brief summaries of the main findings and insights from this work.

## 2.1 Primary literature review: towards "productive interactions"

According to Chouinard et al (2017), impact assessment in the context of agricultural research is fundamentally a complex socio-political phenomenon. This poses important challenges to traditional forms of assessment, mainly rooted in a positivist ideology. For instance, while facilitating a cost-benefit analysis of research programmes, positivist approaches do not account for the social consequences, be it benefits or otherwise, that often result from such programmes. Contemporary forms of impact assessment, therefore, tend towards constructivist ideology (Gibbons 1994). Constructivism, in line with Douthewaite et al (2003), builds on a principle of active learning processes that legitimize knowledge through performativity. This requires adaptable evaluation standards, where "standards" are seen primarily as fluid structural guidelines. Several impact assessment models proceed from the constructivist research tradition:

1) Deutsche Gesellschaft für Technische Zusammenarbiet GmbH (GTZ): the model splits the evaluation process into two phases (Douthewaite et al 2003). The first is internal, done early on in a research project, and focuses on identifying inputs, activities, output, use of output, and direct benefits. The second phase is a project-independent assessment, done some years after the

[1] The authors of the Primary Literature Review were: Jan Moudry (University of South Bohemia), Lisa Blix Germundsson (Sveriges Lantbruksuniversitet), Renee Gonzalez (Lund University), Håkan Jönsson (Lund University), Niels Heine Kristensen (Roskilde University), Viktor Květoň (Bioinstitut), Jan Lehejček (Bioinstitut), Jiří Lehejček (Bioinstitut), Martin Melin (Sveriges Lantbruksuniversitet), and Jan Moudrý sr (University of South Bohemia).

research project has ended. It involves assessment concerning possible indirect benefits and development progress on the aggregate level.

2) Impact Pathway Evaluation (IPE): inspired by GTZ, this model aims to provide a bridge between project outcomes and eventual impacts through a two-step, ex-ante/ex-post assessment system (Douthewaite et al 2003). The critical difference between this model and GTZ is the ex-ante stage, where IPE allows the impact pathway to guide self-monitoring and evaluation.
3) Participatory Impact Pathway Analysis (PIPA): a version of IPE, PIPA involves project stakeholders to describe jointly the project's theories of action, develop logic models, and use them for project planning and evaluation (Alvarez et al 2010). By involving end-users this model adds a learning process and a user account for the usefulness and practical applicability of the outcomes.
4) Outcome Evidencing (OE): an ex-ante ten-step rapid evaluation procedure, based on developing and revisiting theories of change (Douthewaite & Hoffecker 2017). As a type of complexity-aware model, Outcome Evidencing seeks to account for all stakeholders' interests. It does this through recurrent evaluation cycles and, in that sense, it is similar to action-research.

It is relevant to note that, the above-listed models were all developed in relation to particular agricultural projects, thus within unique contexts. Chouinard et al (2017) argue that the challenges evaluators face in practice are so specific to a project's complex sociopolitical and cultural context, they cannot be "solved" via the simple application of a standard model. While the above-given models may serve as a useful basis for framework-development, then, sensitivity to context and situational adaptability remain a key problematic. To further elaborate this problematic, we draw on the experiences relative to three impact-oriented initiatives:

1) Standard Evaluation Protocol (SEP): this Dutch impact-evaluation framework focuses on: the expectation that a research will contribute to socio-economic developments (i.e. its relevance); a research unit's interaction with users of the results and the actual use of the results; and viability, that is, the extent to which the assessed unit is equipped for the future (SEP 2016).
2) Research Embedment and Performance Profile (REPP): also a Dutch initiative, REPP includes five indicator domains, including: science and certified knowledge; education and training; innovation and professionals; public policy and societal issues; and visibility and collaboration (Spaapen et al 2007). REPP assesses achieved impact by looking at: co-publications, divided research

staff, cooperation with the professional sector and the business world, contract research, professional publications, scientific articles, staff mobility, advisory positions and membership in policy platforms, involvement in special programs, publications in refereed journals, and patents.

3) Research Excellence Framework (REF): this UK-based initiative uses quantitative measures and case studies supported by impact indicators, to provide for assessment of social, cultural and economic impact. In a process of expert review, main panels and subpanels with external experts from both science and professional life are responsible for carrying out the assessment (REF, 2011).
4) Social Impact Assessment Methods for research and funding instruments through the study of Productive Interactions (SIAMPI): as the name indicates, a key to this initiative is the concept of "productive interactions" (see below). SIAMPI distinguishes three types of "productive interactions". These may be direct – including, say, face-to-face encounters, through phone, email or videoconferencing. They can also be indirect – i.e. contacts that are established through some kind of material carrier, for example texts, exhibitions, models, or films. "Productive interactions" may also take a financial form – e.g. a research contract, a financial contribution, or a contribution in kind, etc. (Spaapen et al 2011)
5) Socio-economic Analysis of Impacts of Public Agronomic Research (ASIRPA): similar to SIAMPI, this French initiative focuses on the interactions between different stakeholders involved in the research process. ASIRPA measures impact through case studies, using a system of rating scales (1 to 5) in relation to five dimensions of impact: economic, political, health, environmental, and social.
6) Sveriges Lantbruksuniversitet (SLU) model for impact evaluation: assesses societal impact in relation to three dimensions: activities and outputs; outcomes; and impact strategy. The evaluation process orients to such questions as: Is the full potential for societal impact realized in terms of activities, outputs, and outcomes? How realistic is the impact strategy given the depth and breadth of the group's research profile? Are incentives and measures sufficient for the implementation of the strategy? Preliminary tests show that the SLU model performs well in relation to the dimensions of activities and outputs and outcomes. However, less attention is paid concerning the third

dimension, i.e. impact strategy, especially as it pertains to creating incentives for researchers to work with impact activities.

Together, the above outlined initiatives demonstrate that stakeholders tied into social networks constitute valuable opportunities for collective action towards sustainable impact. Especially useful notion in this relation is that of “productive interaction”, broadly understood as an exchange between researchers and stakeholders in which knowledge is produced and valued that is scientifically robust and socially relevant (Spaapen et al 2011). Interactions are seen as “productive” when, as a consequence, stakeholders actually make use of the research results; i.e. when the project outcomes lead to a relevant behavioral change. Looking at “productive interactions” in the ICT research sector, De Jong et al (2014) found that impact-process characteristics can be approached as a proxy for expected impact. According to them, when assessing impacts, a particular attention should be paid to the actual contributions of research to impact, not singly or merely on attributing impact to specific research processes.

## 2.2 Secondary literature review: process- and product-related impacts

In the second stage of the literature review-phase, we took on a broader approach to evaluation frameworks, considering examples outside the scope of the agri-food sector. Specifically, we looked at exemplary cases in healthcare and in the context of transdisciplinary research. These domains have a longstanding tradition of combining research and applied work in everyday practice, thus constituting a valuable background for framework development. In this section, we briefly outline the relevant findings.

Donabedian’s model for evaluating quality of healthcare (Reeve et al 2015) is the most prevalent in this context. In line with the model, information about care quality can be drawn in relation to three broad categories: structure, process and outcomes. Thus:

1) Structure includes all factors that affect the context in which care is delivered. This may include the physical facility, equipment, and human resources, as well as organizational characteristics such as staff training and payment methods.
2) Process is the sum of all actions that make healthcare. It may include diagnosis, treatment, preventive care, patient education and may be expanded to include actions taken by the patients themselves and their families. Processes can further be classified as technical or as interpersonal.

3) The category outcomes contains all the effects of healthcare on patients or populations, including changes to health status, behavior, and knowledge. This also includes estimates of patient satisfaction and health-related quality of life.

Donabedian's model has been criticized on two accounts. Primarily for being linear, i.e. not expressing the relationships between the three domains of effect, but also for failing to incorporate the potential influence of antecedent characteristics. These can be personal, e.g. genetics, socio-demographics, health-related habits, beliefs and attitudes, or preferences. They can also be environmental, e.g. the patient's cultural, political, personal, and/or physical characteristics, as well as factors related to the health profession itself. The next model (Figure 1) is by Reeve et al (2015). This model addresses the shortcomings in Donabedian's.[2]

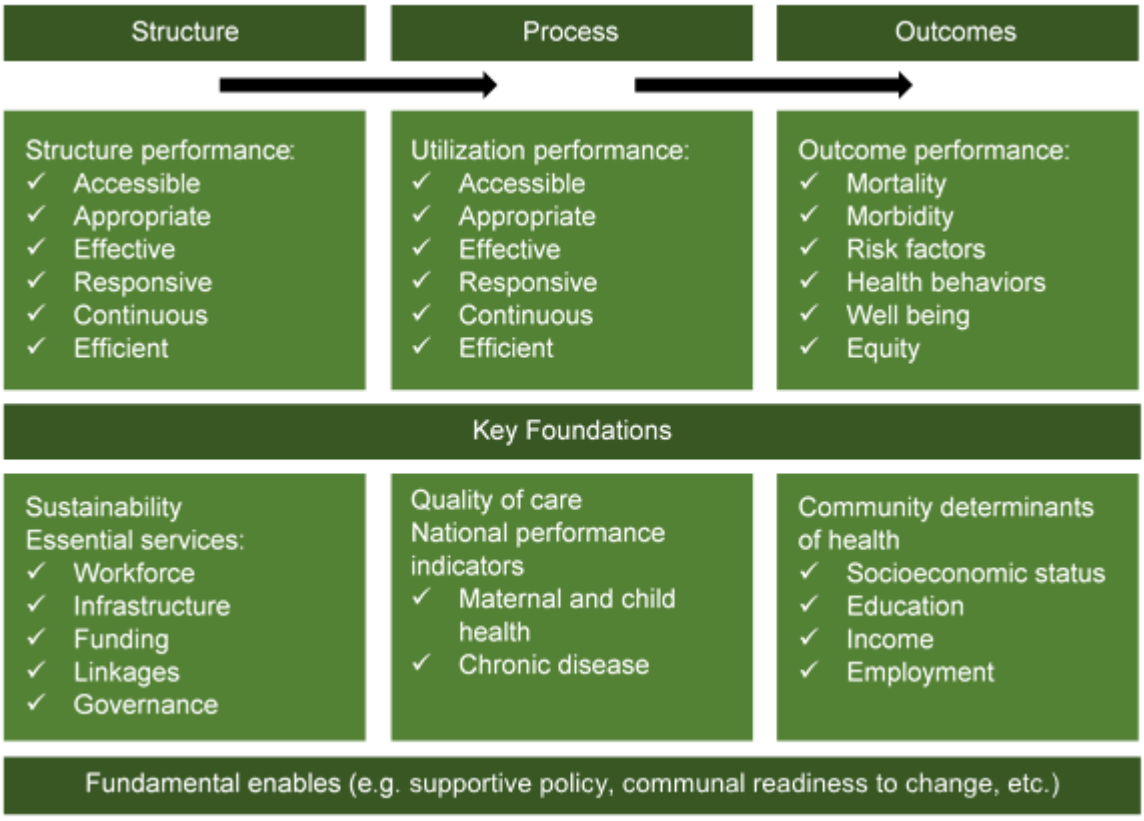



*Figure 1: Health service evaluation framework for remote communities*

Reeve et al (2015) use Donabedian's model as a basis to develop an evaluation framework that takes sustainability, features of the national context, and community determinants into account, as well as considers policy and communal readiness to

[2] Note moreover that Reeve et al's framework is designed for evaluating the quality of healthcare provided to remote aboriginal communities in Australia (2015). The performance components they attach to Donabedian's model reflect that intention.

change as fundamental enablers. Note that in this case the component “sustainability” refers to the capacity of the structures and processes in place to maintain their effects (i.e. their positive outcomes). This is different from NextFood’s version of sustainability as the intended object of impact.

In the context of transdisciplinary research, a particularly relevant impact-focused evaluation model is that proposed by Walter et al (2007). Figure 2 displays this model.

According to Walter et al (2007), the available publications focusing on the evaluation of transdisciplinary projects mostly employ criteria of process evaluation such as competence of the project partners, the adequacy of the problem formulation, the flexibility of the project management, legitimacy, and fairness. In their regard, however, those studies do not provide for an empirical evaluation of societal effects. Relating to this concern, the model below focuses on societal effects exclusively. For Walter et al (ibid), societal effects are primarily about changes in the knowledge and the decision-making capacity of stakeholders. This includes the making of decisions resulting from the transdisciplinary process itself that affect the environment, the economy, and other aspects of the real-world problem in question.

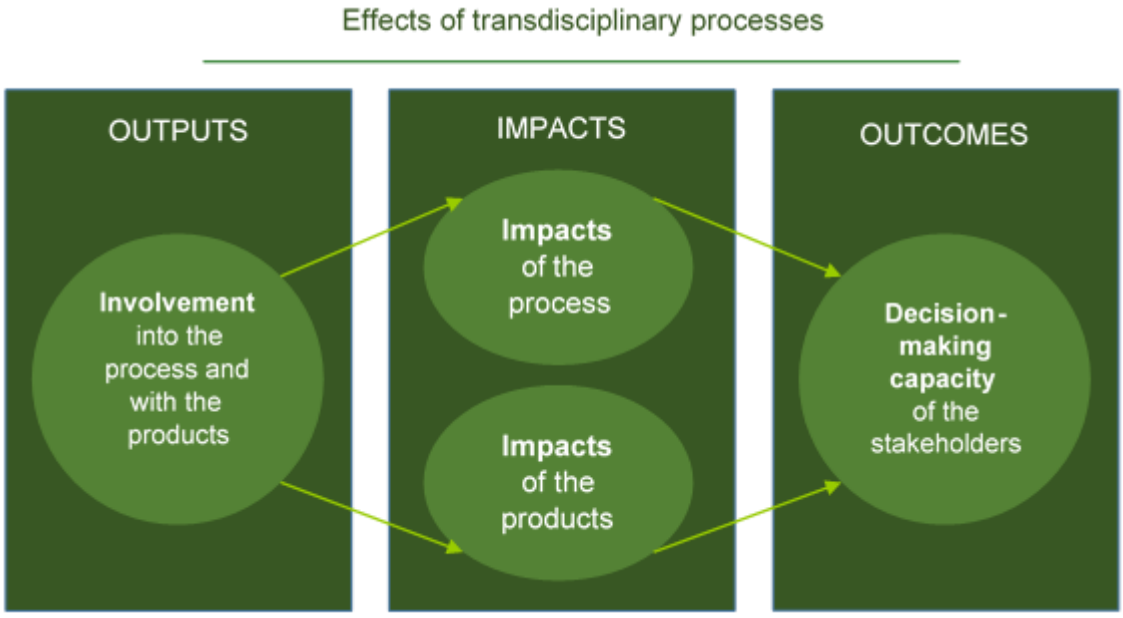



*Figure 2: Framework for evaluating the societal impacts of transdisciplinary research*

Walter et al’s model above configures outcomes (i.e. decision-making capacity) as a function of outputs (i.e. involvement) and impacts. They define outputs as the immediate results of a project on the procedural and the product-related levels; e.g. meetings, hearings, workshops, reports, publications, and other tangible results. In this

view, outputs directly affect the stakeholders participating in the transdisciplinary process. Walter et al define impacts as intermediate effects of a project, representing changes in stakeholders' knowledge, attitude, or behavior. Impacts are further elaborated as cognitive and/or physical consequences of a program. For the purpose of evaluation, Walter et al divide impacts into three distinct groups:

1) Impacts related to the transdisciplinary process, e.g., network building, trust in others, understanding of others, community identification, etc.;
2) Impacts related to the products of the project, e.g., system knowledge, goal knowledge, transformation knowledge, etc.;
3) Impacts that describe the interaction between processes and products, e.g., distribution of knowledge.

The healthcare and transdisciplinary models in this section point to two relevant components of impact evaluation. On the one hand, we note the division of impact as product- and process-related. Not all societal, economical, or environmental impacts stem from research results; the above models demonstrate a way of acknowledging research activities as actually or potentially impactful. In that sense, their differential consideration makes a useful categorization device for impact work. On the other hand, the models emphasize the value in considering communal variables when evaluating impact. Features of concerned stakeholder communities not only affect the realization of hypothetical impacts, but may also provide useful inputs to accounting for impact in the evaluation process itself.

## 2.3 Summary of literature review

The two literature review stages provided a useful starting point for developing a dynamic NextFood framework for sustainability impact evaluation. A table with the revised models in terms of how they resonate with the NextFood Sustainability Impact Framework is given in the Annex. Of particular relevance were the notion of "productive interaction" and the a priori categorization of impacts as product- and process-related. To further develop these components, we drew on expert reflections concerning evaluation of impact from interview and workshop materials.

# 3 Expert Reflections on Impact Evaluation

This section provides a short summary of expert reflections concerning impact evaluation. We describe these from two main sources: interviews conducted during May-June 2019 and expert-forms, used during a NextFood workshop in May 2019.

## 3.1 Interview material: impact as a social process

To gain a first-hand understanding of how experts think about impact evaluation, we conducted interviews. We did nine interviews in total – three in Sweden, one in Denmark, and five in the Czech Republic – each lasting about 40 minutes in average. For a list of interviews, see Table 1. In the interviews, we asked informants to share their personal experiences with evaluating impact, the kinds of impacts measured, what they thought was especially difficult to measure and in what sense. We also asked them to comment on ways to evaluate sustainability specifically and on evaluation in the context of interdisciplinary research settings. Two of the interviews were done in English, the remaining seven in the interviewee's native tongue. The relevant parts of the interviews were transcribed and, where necessary, translated into English.

*Table 1: List of expert interviews*

| Interview (Position) | Organization | Interviewers | Setting (Duration) |
|---|---|---|---|
| Jens Haisler (Senior Advisor) | DK F&U Agency | Niels Heine Kristensen | Phone (35 min) |
| Ericka Johnsson (Professor) | TEMA-G Linköping University | Håkan Jönsson & Ivanche Dimitrievski | Skype (40 min) |
| Miloslav Šimek (Director) | Faculty of Science of University of South Bohemia in České Budějovice, Institute of Soil Biology of Biology Centre CAS | Jan Moudry sr. Jan Moudry jr. | Personal meeting (120 min) |
| Jan Nedělník (Director) | Research Institute for Fodder Crops, Ltd. Troubsko | Jan Moudry sr. | Personal meeting (55 min) |
| *Karel Vejražka* (Researcher & Advisor) | Research Institute for Fodder Crops, Ltd. Troubsko | Jan Moudry sr. | Telephone (60 min) |
| Jaroslav Pražan (Researcher & Advisor) | Institute of Agricultural Economics and Information, Brno branch | Jan Moudry sr. | Personal meeting (60 min) |
| Josef Pulkrábek (Academic staff) | Czech University of Life Sciences Prague, Department of Agroecology and Crop Production | Jan Moudry sr. | Personal meeting (60 min) |

| | | | |
|---|---|---|---|
| Göran Andersson (Program manager) | VINNOVA | Håkan Jönsson | Phone (45 min) |
| Silje Lundgren (Research Coordinator) | Institutionen för Tema (TEMA) | Håkan Jönsson & Ivanche Dimitrievski | Skype (40 min) |

In the various interviews, informants quickly made apparent the multitude of contingencies influencing the choice of forms of assessment. Thus, some evaluators preferred scientometry while others combined forms of output and impact assessments. Generally, the interviewees considered the former type as giving little incentives for application-oriented research. It was also observed that, presently, research is mainly seen as either basic or applied; while a more nuanced differentiation of research might be useful for evaluation purposes. The interviewees shared a sense of research as a situated social process. They observed, for example, that different actors might display diverging personal interests in evaluation. Thus, basic researchers were seen as predominantly concerned with academic visibility, applied researchers with commercialization, while practitioners with practical results. By implication, any evaluation framework privileging a single focus of assessment risks undermining potentially relevant others.

The interviewees noted that, when doing evaluation, evaluators mainly focus on numerically expressible parameters, e.g. the number of dissemination activities or the number of end users. However, not everything can easily be expressed in this way. For example, the interviewees indicated that such "soft impacts" as stakeholders' trust, transparency, or cultural development could not be assessed objectively. One said: "It is always a matter of the evaluator's opinion."[3] The interviewees expressed similar concerns in relation to sustainability. Assessing sustainability impacts was important, according to them, however, the specific assessments, as one interviewee put it, were "always only a subjective judgment". Likewise, a few of the interviewees saw the usefulness of research and its particular societal benefits as "difficult to measure" – due to time as well as due to their subjective nature. According to these interviewees, usefulness and benefit, including indeed environmental consequences, were "long-term issues often occurring only after a longer period of time". The interviewees saw this as a technical obstacle: "How can I measure what I don't know yet?" At the same

[3] The interviewees noted, however, that some types of "soft impact", e.g. knowledge by training, could be inferred through means of comparison.

time, however, this suggests a need to elaborate ways of productively engaging temporality and subjectivity in the evaluation process itself.

Measuring impacts accurately was not a single concern. One of the interviewees, for example, was reminiscing of a situation he had experienced, when the stakeholder companies “saw that we were making a difference, but we could not prove it.” He argued: “companies do not remember that it was at our particular meetings that they started talking” – implying it was precisely on those meetings, which brought the various parties together and thereby incited communication and collaboration between them, that the recognized “difference” began to take shape. However, he continued: “if we claimed it [i.e. the alleged difference], the incubators will be angry”. This situation indicates several key features of impact evaluation. Firstly, it shows that impact, while difficult to measure accurately, is observable and recognizable. Secondly, it shows that evaluation is a situated process and actors have important stakes in how it is done. Thirdly, the situation demonstrates that evaluating impact involves attributing responsibility and ownership for the recognized effects. These features point to the social embeddedness of research and its impacts, suggesting potential from involving concerned actors in the evaluation process itself.

A few of the interviewees observed that, in addition to traditional evaluation parameters, the following key domains need addressing: user involvement, societal needs, how research contributes to empowering people, the extent to which research equips stakeholders with the knowledge and skills to operate beyond particular research activities or projects. We can see that issues of societal impact are prevalent. This can be seen as reflecting an understanding of research and research-evaluation as foremost societally-oriented. In this connection, some of the interviewees entertained the possibility of approaching “impact” as a process, a kind of work involving multiply situated actors managing impact in complex settings. This view differs from the more prevalent conception of impact as “effects”. Seeing impact processually, one of the interviewees noted, for instance, that “impact work” is currently unpaid; it is “expected but not remunerated”; and, according to this interviewee, it is also gendered.

The interviewees saw interdisciplinary research work as primarily being about hospitality, openness, conversational clarity, and mutual respect. For them, productive interdisciplinary activity necessitates a flat work structure, which in turn requires particular material configurations. Interdisciplinary work, a few of the interviewees

observed, displays an awareness of the tensions that accompany the integration of disciplines. In measuring societal impact, then, according to one interviewee, “we need to lift the view from the production of results to practices”. It was suggested that societal impact can be estimated in terms of how interdisciplinary research influences existing power structures in society. It can be perceived, for example, in terms of public engagement; i.e. popular science articles, public interviews, or the news media. Finally, the interviewees proposed that measuring the impact of interdisciplinary studies can involve evaluating career trajectories, e.g. by looking into scholars’ ability to get a job in academia.

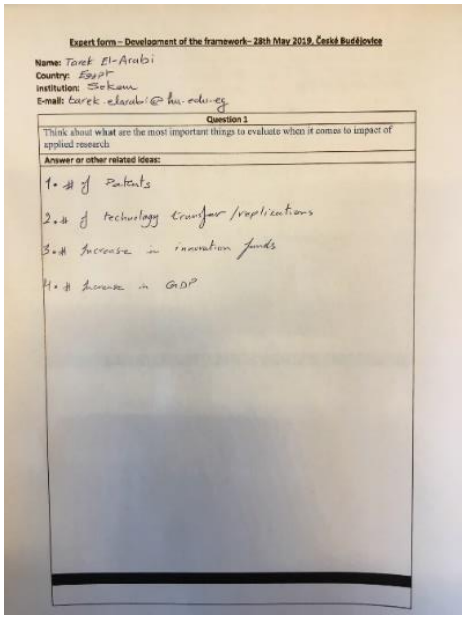
In summary, the interviews produced several themes of particular relevance for the NextFood evaluation framework. The interviews showed that evaluation is a socially embedded activity. As such, it enacts a multitude of contingencies (e.g. methodical preferences, stakes) which, in turn, influence the particular assessment tools used, the selected impact areas for assessment, and so on. The interviews further demonstrated ways of thinking about impact as work – as a kind of process involving a distribution of actors’ time and effort. This understanding compels us to look beyond impact as just measuring, to impact as a way of actually participating in society, the natural environment, and the economy. These insights jointly call for creating a dynamic open framework, which takes temporality and subjectivity seriously and thus, a framework which provides for a joint deliberation and assumption of accountability for future impacts.

## 3.2 Workshop material: impact as a multi-faceted phenomenon

In May 2019, a workshop was conducted as part of the annual NextFood conference. The participants were asked to provide answers to two main questions: 1) what they thought were the most important things to evaluate when it came to impact of applied research and 2) what they thought were the best ways to evaluate those things. The 24 participants were asked to reflect on potential indicators, scales, methods for selecting data, and so on. The participants could write their answers on printed sheets of paper (Figure 3) indicating the two questions.

The workshop participants listed thirty six impact concerns in total. In analyzing these, we grouped them under three types: social, economic, and environmental. As we can see in Table 2, the majority of indicated concerns has a social character, covering a broad spectrum of societal features: from participation, collaboration, and gender

equality, to social media presence, technological adoption and use, food security and policy-making.


Expert form – Development of the framework– 28th May 2019, České Budějovice

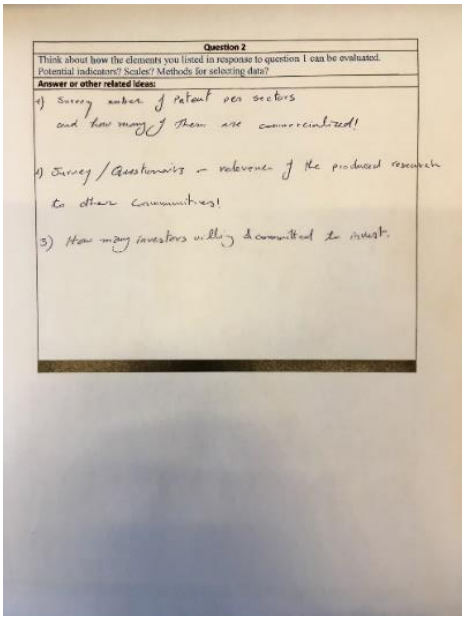
Name: Tarek El-Arabi
Country: Egypt
Institution: Sekem
E-mail: tarek.elarabi@hu-edu.eg

Question 1

Think about what are the most important things to evaluate when it comes to impact of applied research

Answer or other related ideas:

1. # of Patents
2. # of technology transfer /replications
3. # increase in innovation funds
4. # increase in GDP


Question 2

Think about how the elements you listed in response to question 1 can be evaluated. Potential indicators? Scales? Methods for selecting data?

Answer or other related ideas:

1) Survey number of patent per sectors and how many of them are commercialized!
2) Survey / Questionnaire – relevance of the produced research to other communities!
3) How many investors willing & committed to invest.

*Figure 3: Expert-form Sample*

*Table 2: Most important things to evaluate when it comes to impact of applied research*

| Type of Concern | Indicated Concern |
|---|---|
| Social | Number of participating actors |
| | Meeting stakeholders' requirements |
| | Collaboration |
| | Trust |
| | Empowerment |
| | Gender equality |
| | Research projects |
| | Education programmes |
| | Career development trajectories |
| | Social capital |
| | Ethical issues |
| | Implementation of findings |
| | Technology users/Technology adoption |
| | Changes in user practices |
| | Social/cultural acceptability |
| | Distribution of knowledge |
| | Citations outside academia |
| | Policy documents |
| | Social media |
| | Awareness |
| | Effects on food security |
| | Effects on policy-making/visibility |
| | Reduction of human drudgery |
| | Malnourished children |
| | Funding/Investments |

| | |
|---|---|
| Economic | Diversity of income-generating activities |
| | Number of innovations |
| | Number of spin-offs |
| | Technological transfer (replications) |
| | Number of products |
| | Number of patents |
| | Number of concepts |
| | Visibility of research in marketing |
| | (New) Markets |
| | Increase in GDP |
| Environmental | Paths to reduce ecological externalities |

The above-listed concerns are further divisible into “soft” (e.g. trust, social/cultural acceptability, etc.) and “hard” concerns (e.g. funding/investments, number of innovations, patents, products, etc.). A final key feature to note is level. Some of the indicated concerns can be related to a project-level, as features of the research process (e.g. participation or meeting stakeholder requirements) or its outcomes (e.g. number of products, patents, and so on). Others fit a systemic-level, as broader project achievements (e.g. new markets, effects on policy-making, GDP increase, etc.). Yet a third group can be related to an intermediary-level, including such concerns as distribution of knowledge, citations outside academia, social media presence, and so on – all indicators of the work of embedding the project-process or products into the broader society or system.

The workshop participants provided a range of methods for evaluating the above-given impact concerns. As Table 3 shows, a few of these were quantitative. In this category, some participants proposed use of a survey methodology, numerically assessing commercialization activities, patents, willingness to invest, etc. The participants also indicated using number of practice-abstract downloads and citations in social media as quantitative indicators of use/usefulness and awareness respectively. Table 3 also lists a variety of qualitative measures for impact evaluation. These range from using self-assessment scales in articulating such “soft” impact concerns as degree of trust, collaboration, perception of risk, etc., to interviews, focus groups, and combined qualitative forms of assessment including participant observation through site-visits. Analytical methods, such as coding and schematic analysis, were also suggested. We can see in Table 3 that, in few instances, the participants also commented on timing. We take this to reflect the broader concern that some impacts take time to become visible, thus measurable, in this way, suggesting a need for a dynamic framework that allows for successive articulation and measurement of impacts.

*Table 3: Indicated methods for evaluating impact in the context of applied research*

| Type of Measure | Indicated Measure |
|---|---|
| Quantitative | Surveys<br>(Concerning: number of patents; commercialization of patents/products; investors willing/committed to invest, etc. All this should be measured in relation to a baseline value.) |
| | Practice abstracts<br>(Measure downloads and applications of practice abstracts) |
| | Citations in social media |
| Qualitative | Self-assessment scales<br>(Stakeholders rank their perception concerning trust, network, collaboration, knowledge development, ethics, cost/benefit of applications of knowledge results, risks.) |
| | Career paths<br>(Of people involved in evaluated organization/project.) |
| | Stakeholder interviews + Focus groups<br>(Coding and thematic analysis can be used.) |
| | Visits + Interviews<br>(Field notes and observations on site, e.g. on farms and other food enterprises.) |
| | Student evaluations + Self-assessment<br>(Ex-ante, ex-post of skills and impact.) |
| | Teacher evaluations + Self-assessment<br>(Ex-ante, ex-post of skills and impact.) |
| **Comments** | Alumni networks as sources of impact |
| | Time is important<br>(Measure impact XX years after implementation) |

The workshop results demonstrate impact as a multi-faceted phenomenon. While, clearly, the participants tended to articulating social concerns, the sheer variety of impact concerns generally remains a noteworthy insight. We could relate a similar point concerning methods for assessing impact. The particular method depends on the particular impact concern; namely, on its specific character as social, environmental, or economic; or indeed, on its temporality, as short-term and relatively graspable or long-term and elusive. These insights jointly point to a need for an evaluation framework that engages with the situational specificity of impact seriously.

# 4 Summary of Insights and Implications for the NextFood Framework

The review of the existing literature on impact evaluation provided important guidelines towards the development of a NextFood impact framework. The literature review clearly shows a tendency towards constructivist reasoning, seeing impact evaluation as a socially-oriented and socially-embedded activity, where actors co-produce impact. A particularly useful notion in this regard was “productive interactions”, insofar as this notion urges focus on process, inclusion, collaboration, social relevance, and mutual accountability. Further, the literature review indicated advantages from looking at impacts in terms of their differential relations to research products and processes. Careful consideration of such relations provides for a reflexive engagement with impact as a social phenomenon of common concern. The literature review also demonstrated a way of seeing stakeholder communities as complicit in impact evaluation, further suggesting the importance of their inclusion in the evaluation process itself.

To a notable degree, these insights resonate with the expert reflections on impact. The interviews generated a sense of impact as contingent social activities, as open to interpretation, and as actual, albeit not necessarily or always formalized, work. Also, the interview materials hinted to benefits from thinking around impact in terms of scope and temporality. The workshop materials in turn presented impact as multi-faceted, as dependent on its context of interpretation, and in that connection as measurable in variable ways. Together, the expert reflections and literature reviews propose relevancies providing for a dynamic NextFood framework: enabling multiply-situated actors to articulate impact and ways of measuring impact together jointly, introducing reflexivity by relating considerations of product and process, and allowing for successive articulation of impact over time. Crucially, the framework also introduces impact level as an evaluation component, encouraging users to reflect on their role in impact on more aggregate levels, not just in relation to immediate research effects.

# 5 NextFood Framework for Sustainability Impact Assessment

The NextFood framework aims to measure impact in ways which provide for networking and interactive innovation towards sustainability in the agri-food and forestry sectors. As shall become apparent, it does this by articulating its components open-endedly. This provides stakeholders using the framework the possibility to specify the impact areas and related indicators that matter to them. The user is defined as stakeholders interacting with agri-food and forestry research so as to achieve and/or evaluate sustainability impacts. In that regard, the framework has both bottom-up and top-down relevance. The NextFood framework does not standardize sustainability impact. Instead, it acts as a tool for organizing stakeholder interactions around potential and actual impacts. A model for those interactions is given below as the Impact Work Process. This work amounts to an impact index which consists of:

1) A quantitative measure: developed through the use of quantitative methodologies in the process of evaluation. This provides numerical values for each sustainability dimension which reflect stakeholders' understanding of how their research activities and products/results have impacted societally, economically and/or environmentally. These numerical values can then be used to create, for example pie-charts for a visual demonstration of the relevant achievements.
2) A qualitative measure: a descriptive account containing a specification and justification of the selected impact areas, the relevant impact indicators, the particular tools used to assess them, as well as a specification of the impacts assessed through qualitative evaluation methodologies. The qualitative account may also include a reflection on the evaluation process itself.

## 5.1 Structural components of the NextFood framework

The NextFood framework provides for evaluating process- and product-related impacts in relation to social, environmental, and economic sustainability, as inspired by Walter et al (2015). The structural components of the framework are graphically presented below.

The component *Process-related impacts* provides for articulating effects concerning social, environmental, and economic sustainability seen to result from work practices and activities, i.e. the research process itself. The component *Product-related impacts*

enables articulating effects regarding social, environmental, and economic sustainability stemming from the research results. The NextFood Framework articulates two sustainability *Impact themes*.[4] Each theme contains the indicators selected to express the particular sustainability dimension as it relates to either the research process or products.

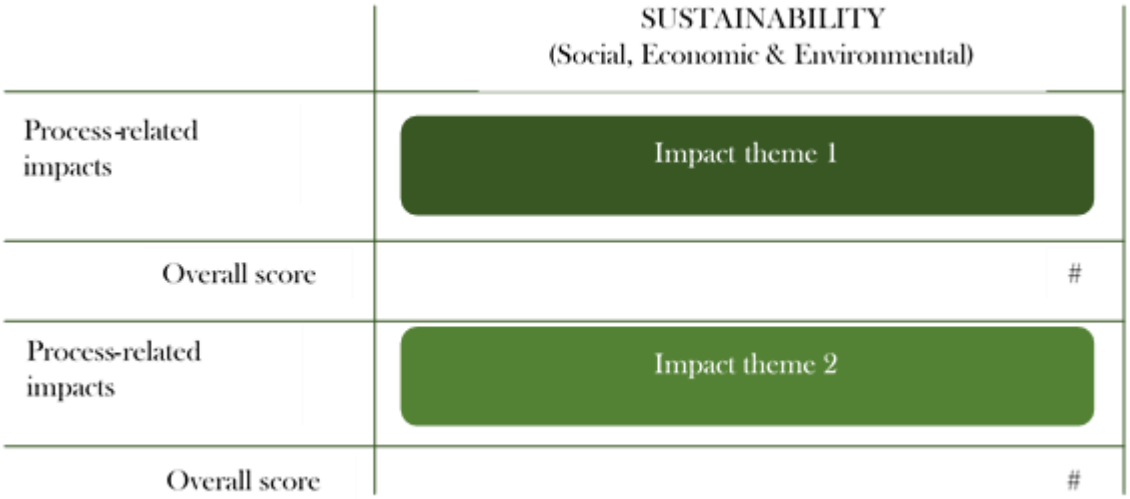



*Figure 4: Structural components of the NextFood framework*

As a differentiation of the two themes, thematic indicators are further organized according to three interrelated levels:

- ✓ Project-level Effects: contains the indicators selected to express how a project's processes and products influence the stakeholder community's capacity to act and perform sustainably.
- ✓ Intermediary-level Effects: contains the indicators selected to express sustainability effects stemming from the work of bridging the project- with the systemic-level. Since parallel forms of mediation work achieve product- and process-related impacts simultaneously, the indicators on this level cut across both categories.
- ✓ Systemic-level Effects: contains the indicators selected to express how a project's processes and products contribute to sustainability broadly, beyond the immediate community of stakeholders.

The above-stated levels are further elaborated in Table 4 below.

[4] In the "impact work process" (see below), these themes are meant to be used as frames of mind, as conversational loci for discussing and organizing impact indicators.

*Table 4: Elaboration of the NextFood framework's structural components*

| | **Process-related Indicators of Impact** | **Product-related Indicators of Impact** |
|---|---|---|
| Project-level Effects | ✓ Include such indicators of social sustainability as stakeholder participation, trust, accountability, involvement, etc.<br>✓ Include economic sustainability indicators demonstrating, for example, the extent to which a project's processes provide for the entrepreneurial capacity of its participants, stronger transparency of invisible work (and workforce), the stakeholders' ability to participate in the local economy, etc.<br>✓ Include environmental sustainability indicators expressing the stakeholders' changes in awareness concerning how their own activities affect the environment, changes in their work practices in this relation, and so on. | ✓ Include social sustainability indicators which exemplify the number of users of, say, a new technology but also, importantly, the extent to which those users are better off as a result of using that technology.<br>✓ Include indicators of economic sustainability expressing, say, the extent to which a project's results or products enter innovation processes, turn into patents or broadly used concepts, etc.<br>✓ Include environmental sustainability indicators showing, for example, the performance of a project's results and products in relation to the production and consumption of environmental services. |
| Intermediary-level Effects<br><br>(Use the same sets of indicators for both process- and product-related impacts). | ✓ Include such indicators of social sustainability as collaboration with external actors, e.g. gender-equality networks, various governmental and non-governmental organizations working with social issues, etc. Encompass indicators showing the extent to which a project engages external stakeholders with their results and products, e.g. citations outside academia, social media presence, etc.<br>✓ Include such economic sustainability indicators as collaboration with funding bodies, the local/national innovation system, etc. Encompass the number and the quality of the relationships of a project with external economic actors which provide for technological replication, follow-ups, innovation processes, etc.<br>✓ Include such environmental sustainability indicators as collaboration and communication with external actors, for instance environmental organizations, societies for nature conservation, etc. Encompass indicators expressing how a project enables the use of its results and products for environmental purposes. | |
| Systemic-level Effects | ✓ Include social sustainability indicators showing, for example, the extent to which | ✓ Include social sustainability indicators pointing to the extent and ways in which a |

| | | |
|---|---|---|
| | a project's processes address broader societal concerns such as consumer ethics, decision-making capacity, etc.<br>✓ Include economic sustainability indicators expressing the extent to which a project's processes lead to, say, changes in economic policies, changes in the distribution of market actors, etc.<br>✓ Include environmental sustainability indicators expressing the extent to which a project's processes lead to, say, changes in environmental policies, consumer use of nature-friendly products, and so on. | project's products are embedded in broader systemic/cultural issues, such as ethics, food-security, etc.<br>✓ Include economic sustainability indicators showing, for example, the degree to which a given project's results or products steer the creation of new markets, their visibility in existing markets, etc.<br>✓ Include environmental sustainability indicators expressing the extent to which a project's results or products affect, for instance, the relevant industry towards the production of more environmentally-friendly technology, etc. |

Table 4 is to be used as an organizational tool for articulating "impact" in the process of evaluation. To this end, participating stakeholders may in addition use:

- ✓ The Planetary Boundaries Framework, articulating nine thresholds: climate change; biodiversity loss; biogeochemical; ocean acidification; land use; freshwater; ozone depletion; atmospheric aerosols; and chemical pollution. (Whiteman et al 2013).
- ✓ UN's 17 Sustainable Development Goals (SDG's), namely: no poverty; zero hunger; good health and well-being; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry, innovation and infrastructure; reduced inequality; sustainable cities and communities; responsible consumption and production; climate action; life below water; life on land; peace and justice strong institutions; and partnerships to achieve the goal. (UN 2019).
- ✓ EU's Five "Mission Boards", namely: adaptation to climate change including social transformation; cancer; healthy oceans, seas, coastal and inland waters; climate-neutral and smart cities; soil health and food. (EU 2019).

## 5.2 Procedural components of the NextFood framework

The NextFood framework constitutes a model for organizing sustainability impact assessment. The complexity of the agri-good and forestry systems makes using a fixed number of standard key impact indicators (KIIs) a challenging prospect in this context. There was thus a need to provide users of the NextFood framework the possibility to specify the impact areas and related indicators that matter in their specific contexts. The following Impact Work model constructs a way of operating the NextFood model in practice.

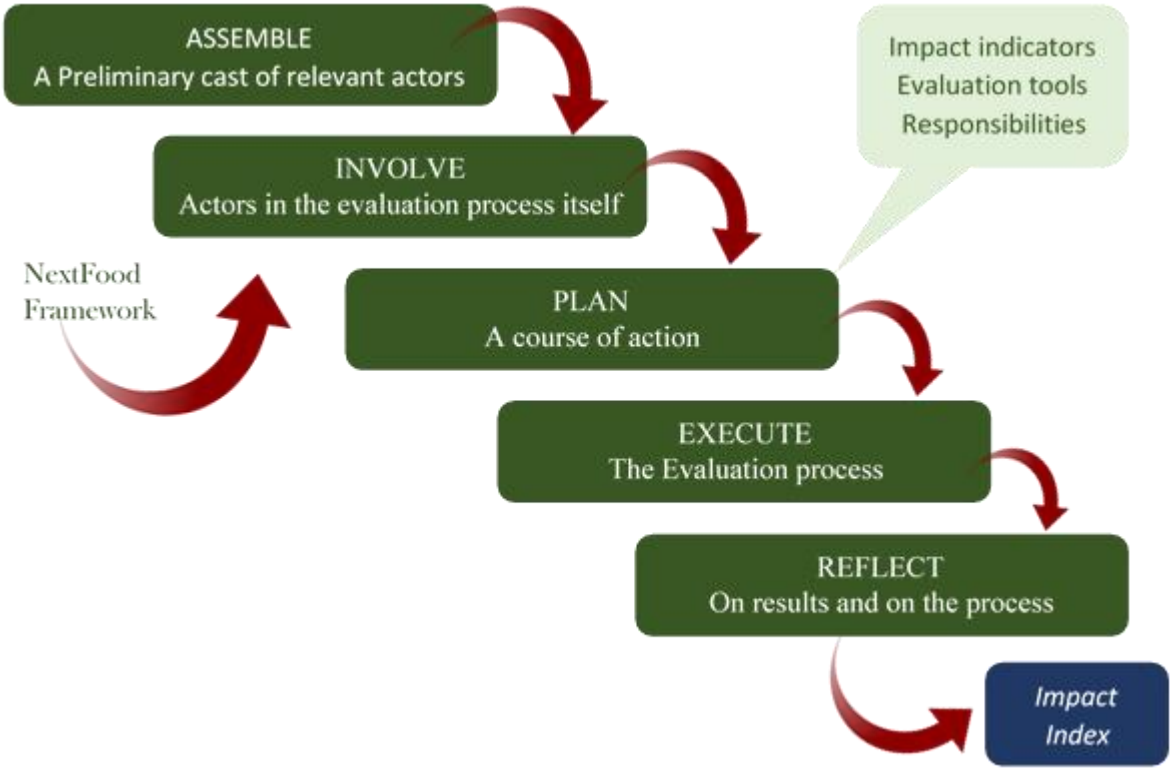



*Figure 5: Elements of the Impact Work Process*

We elaborate the five major components of the above-specified process as follows:

1) Assembling Relevant Stakeholders

As concluded in the background section, impact is not just a measurement; impact is work. Moreover, impact is a socially embedded activity; actors have stakes when articulating how a research work influences society, the economy and/or the environment. This step in the process of evaluation aims to organize “impact work” so as to provide for taking joint action towards and joint responsibility over what is claimed as process- and product-related effects or impacts. To this end, the step consists in

assembling a group of stakeholders who would participate in the evaluation process itself. To ensure diversity, this step will include stakeholders on various levels of involvement, for example: 1) directly involved stakeholders (e.g. participating researchers, etc.); 2) indirectly involved stakeholders (e.g. supporting organizations, etc.); and 3) non-involved but affected stakeholders (e.g. consumers, users, etc.). This group of stakeholders will be responsible for articulating "impact" together, as well as for the process of measuring impact itself. The group should be conceived as open, i.e. allowing for the possibility of joining actors as the evaluation process requires it.

2) Involving for Impact Evaluation

Assuming shared responsibility for impact necessitates a particular model of stakeholder interaction, as explained in the NextFood's Research Protocol (Steiro et al 2019). This approach advocates: 1) a shift from theory to phenomenon as the starting point for the evaluation process and 2) a shift in focus from knowledge to competences needed to take informed and responsible action as the ultimate goal of evaluation. Practically, these two "shifts" translate to engaging stakeholders into a dialogue over 1) actual/potential impact areas, 2) ways to assess those impact areas, and 3) delegation of responsibility concerning monitoring and assessment.

In this stage, the stakeholders should use the NextFood framework as a vantage point for discussion. The aim is to decide on the most relevant indicators to be used to express the various framework themes. As hinted earlier, to this end, the stakeholders will be encouraged to use the UN's 17 Sustainable Development Goals, the model of Planetary Boundaries, and EU's five "Mission Boards" as useful resources for articulation. Also, they will be encouraged to use existing (or make new) platforms of/for impact negotiation.[5]

3) Planning a Course of Action

Once the impact indicators, the tools for addressing them, and the individual responsibilities are in place, the assembled group of stakeholders does step 3, articulating a plan of action. This step speaks to the temporality of impact: that not all effects are easily "measurable" at any time. Practically, this translates to deciding what

[5] By "impact negotiation" we mean that "impact" is, as our empirical research shows, potentially a contested phenomenon. Different actors may turn out to claim ownership of the impact. Platforms, such as Facebook groups or Twitter, etc., are possibly useful starting points for gaining a sense of the "impact landscape"; i.e. an understanding of who claims impact, on what account, why, the kinds of impacts claimed and the relations (of conflict or synergy) between them. This understanding may help towards the specification of the NextFood framework in the process of evaluation.

will be measured/looked into when, for how long, and the resources necessary for doing this. This leads to:

4) Evaluation Phase: Putting the Evaluation Plan into Motion

At this stage, the involved stakeholders implement the methodologies for accounting impact and organize their individual findings. The stakeholders will be requested to keep, in addition, notes of the emerging challenges and possibilities, tensions and ad hoc realizations. This leads to the final stage.

5) Reflecting on Results and Evaluation Process

This component includes two aspects. Firstly, at this point, the relevant stakeholders are expected to advance their individual inputs to impact evaluation. They report their results to the group: what they have done, what has been impacted and to what extent. Secondly, the relevant stakeholders are expected to reflect jointly on the evaluation process. NextFood's Research Protocol (Lenaerts et al 2019) may serve as a basis in this relation. Key is to exchange experiences, what has been learned and what not, the difficulties encountered in the process, and so on. At this stage, the stakeholders may also specify impacts that remain hypothetical; impacts that are contested, who contests them and on what basis. We may call this additional aspect "painting the impact landscape". These reflections and results amount to an Impact Index, as articulated in the start of this section.

## 5.3 Involving Practice Abstracts into the Impact Work Process

The practice abstracts format makes an important part of the Horizon 2020 program (European Commission 2016). This format was developed for 1) enabling and incentivizing efficient knowledge exchange among partners and 2) disseminating project results in ways understandable and relevant for practitioners. Practice abstracts constitute short summaries for practitioners. As such, they contain three key specifications. Firstly, all practice abstracts must include a statement of a given project's objectives; i.e. the problems or opportunities the project addresses, which are relevant for the practitioner/end-user, and ways in which they may be resolved. Secondly, practice abstracts must contain a specification of the expected and/or actual outcomes, i.e. results of the project. Thirdly, all practice abstracts include a set of main practical recommendations; for example, a statement as to what the main benefits are for the end-user if the generated knowledge is implemented, or a statement concerning

how practitioners can make use of that knowledge. As summaries, the practice abstracts should be as interesting as possible for end-users, employing a direct and easily understandable language and pointing out entrepreneurial elements which are especially relevant for practitioners (e.g. related to cost, productivity, etc.). The work with practice abstracts, therefore, is key to ensuring impact on the practical level concerning agri-food and forestry research.

The structural and procedural components of the NextFood framework facilitate work with practice abstracts in two main ways. On the one hand, they make the groundwork for articulating practice abstracts. By engaging stakeholders in the evaluation process, researchers may learn what “impacts” matter to those stakeholders and how such “impacts” may best be achieved. On the other hand, the models enable an assessment of the impact of the practice abstracts themselves once they are published. In other words, the framework provides for setting the impact of the practice abstracts on the evaluation agenda, as one of the impact areas to be assessed.

# 6 Conclusions, Critical Remarks & Next Steps

The NextFood Framework renders evaluation as a dynamic (and continuous or periodical) exercise, where stakeholders themselves and jointly specify the impact indicators relevant to their particular contexts. The temporal features of the framework enable a cumulative articulation of impacts in the course of the research work. This provides for learning, as well as for using indicators that correlate with the timing of the work. Using the framework results in an impact index, including quantitative and qualitative components. While the framework is primarily dedicated for evaluating impact of applied research, the integrated approach of the NextFood project also encourages the strengthening of links between research and education. A potential way of using the framework is as a tool for evaluating the impact of education programmes in the AgriFood sector. This potential will be dealt with in the later phases of the NextFood project, in close collaboration with *WP3 Future Curriculum, Education and Training System*.

At this point, we should also indicate our awareness of several important challenges concerning the framework components. Firstly, impacts are not easily divisible into the general categories of “social”, “economic”, and “environmental” (i.e. not always in straightforward ways). Simultaneously, the same research processes or products may perform differentially in relation to those sustainability categories. Secondly, impacts on some levels are easier to imagine and elaborate than on others. For instance, while research participants may be able to provide a sense of immediate, project-level impacts, they may be at a loss in seeing how their activities and research results perform on the broader, systemic level. Thirdly, the framework is flexible, in that the stakeholders themselves are responsible for specifying impact areas and indicators. This provides the advantage of taking individual contexts into account. Simultaneously, however, that flexibility risks comparability which, as is the presumption, requires a standard. Fourthly, our Impact Work Process model provides for inclusive participation of diverse stakeholders in the evaluation process itself. This enables taking joint responsibility for this process, thus for what ultimately is claimed as the “impacts”. Still, this raises a few questions: How should the relevant stakeholders be determined? How large should the stakeholders group be? Who will participate in which step, in what ways and to what extent? Finally, stakeholders on various levels of involvement might

have different and potentially conflicting views on impact areas, impact indicators, or methods to assess them; they may claim impacts differently.

Further development of the NextFood framework in terms of its components and practical use constitutes a key next step within WP5 of the NextFood Project. The validation of the framework will be performed in two pilot-tests, one in Sweden and the other in the Czech Republic. The framework will also be used in the internal evaluation of the research process in the twelve cases of the NextFood Project where learning and change in a multi-stakeholder environments are emphasized. The NextFood evaluation framework will be aligned with NextFood's action research protocol, focusing on process, learning and participation. It will be used as a tool for organizing forthcoming practice abstracts in the NextFood project, both in the construction of the practice abstracts and in the process of evaluating the impact of the practice abstracts (see above). In the pilot-test phase, the emerging critical remarks, especially in relation to the above-stated challenges, will constitute the priorities to address towards making the framework ready-to-use in 2022.

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# ANNEX

Existing evaluation methods and their relevance for the NF framework

| Model | Key Model Elements | Resonance with NF Framework |
|---|---|---|
| GTZ<br><br>(program theory; linear logic) | ✓ Early internal evaluation and ex-post evaluation | ✓ GTZ & IPE approach evaluation as a continuous process, encompassing internal/external and ex-ante/ex-post stages. This approach is relevant to the NF framework, resonating with the NF Impact Work Process model.<br>✓ Still, GTZ and IPE are based on a conception of impact pathways as linear, considering a technological transfer from science to end-users (i.e. society). By contrast, the NF framework involves end-users in the articulation of the technology in terms of its effects/impacts in the process of its making and development. |
| IPE<br><br>(program theory; linear logic) | ✓ Ex-ante and ex-post evaluation | |
| PIPA<br><br>(program theory; linear logic) | ✓ Ex-ante and ex-post evaluation; participatory planning and evaluation | ✓ As is PIPA, the NF framework incentivizes a highly participatory evaluation process, including end-users. |
| OE<br><br>(complexity science; non-linear logic) | ✓ Ten-step looping method for evaluation, monitoring and learning<br>✓ Account for non-linearity and complexity<br>✓ Capture evaluation during the research process, not after | ✓ The looping evaluation is highly relevant for transdisciplinary projects, therefore for the NF framework. This is similar to how NF cases are being evaluated (ref. WP3). Other relevant features include OE's focus on the research process, its learning functions, and participation. |
| SEP<br><br>(scientific excellence and societal impact) | SEP capitalizes on the following elements:<br>1. The expectation that a research will contribute to socio-economic developments, i.e. its relevance;<br>2. The interaction with users of the results and the actual use of the results<br>3. The viability, as in the extent to which the assessed unit is equipped for the future. | ✓ SEP resonates with the NF framework's focus on contextual relevance and stakeholder interactions. As is presently, the NF framework does not explicitly account for the component viability. |

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| REPP<br><br>(reflects a shift from a Mode 1 to Mode 2 research; science and society are approached as moving targets) | ✓ Focus on the mission and self-image of the group;<br>✓ Empirical construction of the research groups profile;<br>✓ Analysis of the stakeholder environment;<br>✓ Feedback phase.<br><br>The REPP evaluates:<br>1. Science and certified knowledge;<br>2. Education and training;<br>3. Innovation and professionals;<br>4. Public policy and societal issues;<br>5. Visibility and collaboration | ✓ While REPP articulates a standard division of impact areas, the NF framework allows participating stakeholders themselves to specify these in relation to the three domains of sustainability – social, environmental, and economic. |
| REF<br><br>(scientific excellence and societal impact) | ✓ Quantitative and qualitative data are collected and assessed by expert panels with participants from both science and professional life.<br><br>Additionally, REF articulates standard weights to the impact aspects under evaluation:<br>1. Outputs in terms of originality, significance, rigor with reference to international research quality standards. (65%)<br>2. Impact in terms of reach and significance on the economy, society and culture. (20%)<br>3. The research environment in terms of its vitality and sustainability. (15%) | ✓ As does REF, the NF framework includes both qualitative and quantitative components.<br>✓ The NF framework does not distribute a standard weight to the various evaluated impact aspects. |
| SIAMPI & ASIRPA<br><br>(“productive interactions”) | Productive interactions:<br>✓ *direct* –face-to-face encounters<br>✓ *indirect* – i.e. contacts that are established through some kind of material carrier<br>✓ *financial* form, i.e. in kind or a financial contribution | ✓ The component “productive interactions”, in all its three indicated forms, is highly relevant for the NF framework. |
| SLU<br><br>(scientific excellence and societal impact) | ✓ Activities and outputs;<br>✓ Outcomes;<br>✓ Impact strategy. | ✓ The SLU model’s focus on societal impact is highly relevant for the NF framework. |
| Donabedian & Reeve et al<br><br>(impact evaluation in the | ✓ Structure<br>✓ Process<br>✓ Outcomes | ✓ The models broaden the sense of factors influencing impact, which the NF framework takes as a basis towards articulating an |

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|---|---|---|
| context of healthcare) | | inclusive process of impact evaluation. |
| Walter et al<br><br>(impact evaluation in the context of transdisciplinary research) | ✓ Impacts related to the transdisciplinary process<br>✓ Impacts related to the products of the project<br>✓ Impacts that describe the interaction between process and products | ✓ The model emphasizes the social embeddedness of impact and impact-related activity and provides a way of categorizing impacts as product- and process-related. |