



CropBooster-P

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Communication and outreach from a future large crop-yield programme.

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Introduction.

1. Internal organisation of programme communication – evolving document

A future large crop-yield programme will need to communicate to a wide range of external parties for different reasons. At least in part this communication will need to be shaped according to the structure of the programme – a matter which has yet to be resolved. In principle the programme could be centralised (rather like ITER, or the LHC) or highly decentralised with small units dispersed within existing universities and research institutes. The organisation will have consequences for communication – will communication be handled by a central communication and outreach bureau or dealt with, at least in part, locally? Until these details are agreed the communication and outreach plan will remain in draft form, to be finally revised upon completion of the management and organisation plan. Other tasks with future completion dates will deal with topics related to this task (eg deliverables 3.2, 5.3, 5.4) will result in adjustment of this plan. This document is therefore an interim document that can only be completed once the deliverables for an Outreach Strategy (deliverable 3.2), Responsible Research and Innovation (deliverable 5.4) and Programme Management and Supervision (deliverable 5.3). The latter two deliverables are particularly important; communication is a two way process in which target groups receive information, beginning a dialogue. The status of this dialogue with different target groups, and – if appropriate - how representatives of these groups might be selected, and who will be responsible for maintaining any dialogue will depend on the design of the programmes RRI and organisation. These deliverables are not yet available, so what follows here is more a dissemination plan.

2. Background - the future crop yield improvement programme and agriculture, food and climate change

The future crop yield improvement programme will be at least in part (and probably a large part) be funded by the EU, possibly with further support from National or local Governments and the private sector. It is a programme that seeks to improve crop yields by producing innovative genetic resources that can be used by plant breeders to produce new high yielding crop plants. These higher yields should be produced sustainably and they should be nutritious. Crop plants while primarily destined for food (human and animal) are expected to also serve non-food uses (eg cereal straw as a



resource for the chemical industry) as part of the drive to better sustainability. Not only, therefore, must the plants be nutritious but they must otherwise be fit for purpose as part of a complex European complex, sustainable agriculture and food bioeconomy.

3. The challenges facing the future crop yield improvement programme and communication

Agriculture and food within the EU has complex cultural and emotional resonances connected variously to economics, rural life, land ownership, the landscape, and food acceptability and sovereignty. Currently within the EU the regulations attending the use of genetically modified and gene edited crops in agricultural production are very onerous. As a result it is essentially impractical to develop for the European market new commercial genotypes using these techniques. So while it is possible to use transgenesis and gene editing for research into crop improvement, any enhanced genotypes so produced will, as things stand, not be easily used in agriculture. The production of phenotypically comparable genotypes by means of conventional breeding approaches that exploit natural variation would remain as the practical route for improving the crops available to Europe's farmers. This assumes that natural variation exists that encompasses the trait under question. Further, making use of natural variation of traits combined by conventional plant breeding in this way faces considerable time constraints with regards to adaptation to a sustainable "greening" of the EU bioeconomy. The future regulation of novel plant breeding techniques, such as gene editing, within the EU is being discussed.

Agriculture is also entangled in a complex way with the climate change debate, which is itself multifaceted. Agriculture is variously seen as a sink for atmospheric CO₂, as a source of greenhouse gases, as a symbol for unjust over-consumption, as a destroyer of nature, and as a guardian of the natural environment. The contradictions are evident. The future crop yield programme will therefore exist in a very complex landscape because of its connection to agriculture and plant breeding and the network of interests and opinions that intersect them.

Science communication serves the reflective exchange of information, facilitate education and may also provide entertainment (e.g. scientific story telling). We see communication as a dialogue – we inform, we listen and we respond by explaining, and optimizing, our scientific recommendations. Communication serves every phase of the programme from project planning to outcome interpretation.



Communication and outreach from the crop yield programme will be essential and will need to be carefully and fairly managed. We need to inform and interact via a dialogue with various social groups, telling them about what we are doing, why we doing it, how we have succeeded and how it can be used to benefit the society, and reacting to their responses. These different groups will need to be served by different media that reflect the kind of information exchange we want to establish (dissemination and reflection). The peculiar sensitivity of agriculture and food makes the process of communicating about a crop yield improvement programme challenging. Beyond the scientific findings and facts, societal and political values shape communication (efforts). This will be a live process that cannot be defined by an algorithm so will require expertise in communication. It is also important that our message is clearly a fair and reasonable representation of the evidence and that it is not tainted by the appearance of propaganda. Trust – its establishment and its maintenance will be essential.

It is important that certain key groups are informed (and see TABLE 1):

- Policy makers and public funders of research
- The plant breeding sector
- The agribusiness sector
- Farmers and their representative organisations
- The general public – the consumers
- Those in education or being educated
- The broader plant (and associated) sciences research community

Each of these groups represent different viewpoints, may use different “languages” and prefer different ways of communication. A minority will be able to participate in detailed scientific and technical conversations, but many participants will promote group-specific values, needs and concerns that a research programme could interfere with. The communication strategy shall identify and facilitate the use of the appropriate means of communication to create a fruitful dialogue between the programme (partners) and these societal groups. The full development of a communication strategy will depend on the conclusions of some other deliverables (3.2, 5.3 and 5.4), so what will be described here will be more the dissemination aspect of communication.



Some of these groups have a strong scientific and technical background and be connected, more or less closely, to the research being conducted in the programme. This will include some policy makers and funders, most people in the plant breeding and agribusiness sector, the plant sciences community outside the programme, and a scattering elsewhere. People with a scientific background aligned with the programme will expect communication at some point via the established media of peer-reviewed papers, reports and oral presentations. Within the context of a research programme, this form of communication is self-evident and routine. These formal means of scientific communication does not mean that this group will have no interest in other means of communication. In addition, however, we will add some innovations to this routine offering. These will be summarised in section 4. In addition to these more or less professional forms of communication intended for a scientifically experienced audience, we also need to communicate to a broader (lay) audience who have a general value driven view to the research programme. Communication with this broader audience will be described in section 5, and the target groups for this more scientifically summarised and digested information are, policy makers, farmers and their representative organisations; the general public, and those in education.

In the longer term, therefore, the status of English within the EU is uncertain. English will, however, remain the working language of science and for the foreseeable future it will be a major working language within the EU. We assume, therefore, that for the duration of the programme formal reports will continue to be written in English, and scientific papers, international conferences (etc), and other communications intended for professional use, will be in English. Communication intended for non-professional use (covered in section 5) should be in the official languages of the EU. If it is not then we will have failed to communicate with these target groups on a European basis. How this multi-lingual provision will be best achieved will depend on the organisation of the programme. If it has a highly centralised structure the expertise needed to provide a multi-lingual communication will need to be organised from a central communication bureau. If the structure is decentralised then there will still need to be a central communications bureau but that can work with local communications offices in the hosting Universities and Institutes to provide a complete language coverage. Even if a decentralised programme would not have activities in every EU country it is likely to have activities in many, so finding the skills to translate to all EU languages should in that case still be easy.



Communication to the scientifically informed audience via well-established procedures

This section will deal with various media or forums for communication that are normal in science and scientific programmes, so this section will deal with professional communication from the programme. Some communication means will in the first instance serve as a means of dissemination while others encourage dialogue and may essentially be employed in early stages (planning stage) and for interpretation. They will, however, in all cases provide scientific and technical details and demand corresponding background, This form of communication will largely be targeted at people in the classes ‘policy makers and public funders of research’; ‘The plant breeding sector’; ‘The agribusiness sector’ and ‘Farmers and their representative organisations’ (see also TABLE 1 and note that some in these target groups may prefer more summarised information). These are the audience who expect a more detailed, technical form of communication which they can treat as a normal scientific communication alongside documents like policy briefs that summarise programme activities. Formal scientific communications are expected to be treated as an invitation to criticise and debate according to the normal manner of scientific discussion. This professional communication will also be the way that the programme formally reports its findings – its discoveries and innovation. Other forms of communication will be substantially derived from, and secondary to, these primary formal communications. It is the generally rigorous process of peer-review and the implicit right to criticise that creates trust in this form of professional publication – trust is not blindly given but earned.

1. Reports to funders

Any scientific research programme will have well-established procedures for communicating their progress with funding bodies and organisations. Communication of this kind will usually be in the form of a report with technical, scientific content, sometimes accompanied by presentations or lectures. The programme will have a reporting obligation to describe its activities and progress to funders and if made publicly available these periodic reports would also form part of a broader communication from the programme. It is likely that while these reports will be technical in nature they will also have a brief ‘executive summary’ that will be more generally accessible. Their largely technical nature means that these reports would not serve well as routes to inform the non-scientific public. To protect IP progress reports are also often not intended for a wider, more public distribution. Nonetheless consideration ought to be given to making these reports-to-funders publicly available, first on an interim basis after redaction of IP-sensitive parts, followed by full disclosure after an agreed time window to allow protection of IP.



2. Peer-reviewed publications

Working in a scientific research programme, researchers will be expected to publish in scientific journals, and present their work at symposia/conferences and seminars. Scientific publication in peer-reviewed journals will naturally, therefore, be an important vehicle for communication.

Increasingly raw (or more basic) data need to be made available with publication. In addition the programme will have a reporting document in which discoveries and innovations will be described in detail and these documents will include links to raw data. Thus data will also be made freely available. The peer-review process is not without its faults but it remains as a largely respected means for ensuring the quality of scientific information entering the public domain. Peer-reviewed publications therefore remain the gold standard for scientific information and are seen as a form of public record. Such publications will often be for the programme the foundation from which other many other more generally accessible communications spring (articles in newspapers and periodicals, broadcast items, web-site news etc). It is important that these peer-reviewed publications are openly accessible to ensure that anyone who wants to read an article can do and further that the data underpinning these articles are made reasonably available. Within the programme we must therefore have an open access rule to ensure that all publications are freely accessible and not locked behind a paywall. Note, however, that even when openly accessible, scientific publications are technical publications that will usually only be easily understood by scientists working in that field of research. To increase accessibility we therefore feel it would helpful if every publication emerging from the programme would be

1. accessible from the programme web site (or with a linked to the publishing journal site from the programme site) and
2. should be accompanied by a short executive summary of the paper, which should be at some point edited by someone with scientific journalism expertise.

These measures we feel will ensure that the scientific publications produced by the programme are made as accessible as possible. It should be noted that scientific publications are often the basis of news, radio, internet articles etc following press releases produced by press officers. These releases describe the highlights of papers in a way that allows science journalists to rework them as news articles. This form of communication will be referred to later.

3. Seminars, conferences and symposia



Different formats of seminars, conferences, symposia and workshops can serve different goals in the course of a research programme. They offer ways to explore topics/research fields or to integrate and to reflect on external views, as well as to present and to discuss research outcomes. Formats may be adjusted to specific target groups.

Members of the programme will, as is usual, present their work orally at symposia, conferences and seminars (or lectures). The programme will itself organise symposia/conferences and seminars. Making these physically completely open to the public is probably impractical for reasons of capacity and safety, but these conferences etc should be made as accessible as possible to funders, plant breeding companies and other professional groups. Journalists should also be invited (the number of journalists attending plant science conferences seems to have diminished in recent years). The communications bureau of the programme should ensure that all conferences, and similar, organised by the programme which are more than just informal, internal group meetings should be open to these professional stakeholders.

The question naturally arises about the extent to which seminars, conferences etc should be streamed or recorded to make them more widely available on-line (and ‘seminars’ become ‘webinars’). This does seem to be generally desirable, within some limits for IP protection and taking into account reservations by some about being on public display via the internet. The IP problem is obvious – a recording of a presentation might be used to invalidate a later patent application (see deliverable 5.2 for a description of programme IP management principles). This can be avoided by making clear that recording will take place, though a consequence might be that speakers will be guarded and less open. The case of reticence to be on public display is more difficult. Some people do not want to be recorded and we ought to respect that as a matter of privacy. Thus recording or streaming would have to be dealt with on a case-by-case basis. Certainly speakers should be trained in how best to present themselves in the world where recording or streaming might be more normal. A recording is an un-erasable legacy in a way a normal presentation is not.

4. The reporting document

The kind of document that could be used to formally describe the discoveries and innovations to the primary users of these discoveries has been described elsewhere (deliverable 5.1). This document also makes clear that effective communication between the programme and the primary end-user of



the programme’s discoveries will depend strongly on the culture and organisation of the programme.

5. Education and training

Science communication can inform and explore how innovations can be used and implemented. For a professional audience it is often assumed that describing and explaining the science will be sufficient. We will however have a programme that will be diverse and innovative so we will need to take more account of the need to inform our professional audience as well as to explore their attitudes and needs. For that we believe two options are attractive. First, workshops – short (1- 2 day) advanced courses which assume a reasonable and specified degree of prior knowledge and that would offer advanced training on specific topics to participants from within or from outside the programme. Second, recorded, on-line lectures or mini-lectures (and seminars or webinars) presented individually or as part of a series and dealing with specific topics in way to educate the viewer about that topic. These lectures could be made available – if desired – via the normal on-line providers such as YouTube as well as from our website. We see these lectures forming part of a larger offering of educational material extending from school to post-graduate level that will be provided by the programme.

6. The Culture of openness

The more the programme has an culture of openness and participation within which all researchers are invested with the sense of obligation to devise new options for crop-yield improvement the more effective communication to the primary end-user (in particular) is likely to be. This issue will be dealt with in the documents dealing with the management and supervision of the programme (WP5.3) and responsible research and innovation (WP5.4) and once these deliverables are available we will modify this deliverable to take account of their conclusions

TABLE 1.

targets groups	Primary media or forums	Objectives / Content
Policy makers and public funders of research	Formal programme reports; project reports (WP5.1); Symposia, conferences, seminars and workshops –	Demonstrate and validate the progress, relevance, acceptance of the programme. Inform policy



	<p>including expert panels, dialogue forums; personal contacts, ad hoc meetings, online tutorials/lectures, scientific publications, web site, newsletter.</p>	<p>makers (EU and National Government levels) of the scientific background, options and limitations of yield increase, sustainability, nutrition and crop yield improvement. To be seen as a source of honest and robust advice. To support national efforts to develop other connected research programmes. Content: largely summary information but with full access to all other forms of information. Available largely in English but with some summary information in all EU languages.</p>
<p>The plant breeding sector and partner programmes</p>	<p>project reports (WP5.1); symposia, conferences, seminars and workshops—including expert panels, dialogue forums; personal contacts; ad hoc meetings, online tutorials/lectures; scientific publications, participation in project, newsletter</p>	<p>To maintain a dialogue at multiple levels with this sector as the likely primary user of the discoveries and innovations of the programme. To ensure they are informed of our progress and to hear their views of our programme. Content will largely be high-level scientific information. Available largely in English but with some summary information in all EU languages.</p>
<p>The agribusiness sector</p>	<p>project reports (WP5.1); symposia, conferences, seminars and workshops—including expert panels,</p>	<p>To keep the agribusiness sector aware of our progress and to offer a channel for them to give their views of</p>



	<p>dialogue forums; personal contacts; ad hoc meetings, online tutorials/lectures/webinars; scientific publications, participation in project, professional publications, website,</p>	<p>the strategy for yield improvement. Content will range from high-level scientific content to more summary and digested technical information. Available largely in English but with some summary information and articles in the professional press in all EU languages.</p>
<p>Farmers and their representative organisations</p>	<p>symposia, conferences, seminars and workshops – including expert panels, dialogue forums; ad hoc meetings, online tutorials/lectures/webinars; scientific publications, professional or trade publications, summary reports, newsletter, website.</p>	<p>To keep farmers informed of progress to increased yield and the consequences for their industry and to allow them to prepare for new crops and practices (eg the full implications of sustainability); to establish and maintain their trust in the programme; to get their opinion of what we are doing in terms of the practice of farming. Content – digested and summarised technical information with educational content as required. International material in English, but with national presentations, publications etc in all EU languages.</p>
<p>The general public – the consumers and taxpayers</p>	<p>online tutorials/lectures/webinars; press releases and broadcast and webcast media; social media; website, summary reports, brochures,</p>	<p>Inform the general public about the activities of a programme being conducted in their name, to help them trust us, to allow them to learn more about what we</p>



	newsletter and factsheets, regional dialogue forums; TED Talks etc	are doing and why we are doing it, to open a channel to allow them to tell us what they feel about our activities. Content: digested and summary scientific material in an accessible form and in all EU languages
Those in education or being educated	online tutorials/lectures/webinars; education factsheets and study material, teaching support material;	To provide teaching resources for school and higher education levels on the science of crop yield improvement. This material should be suitable for on- line or face-to-face learning (ie supporting the teacher and the learner) and should be available in all EU languages.
The broader plant (and associated) sciences research community	symposia, conferences, seminars and workshops; – including expert panels, dialogue forums; personal contacts; ad hoc meetings, online tutorials/lectures; scientific publications, participation in project, newsletter.	The normal process of scientific communication. To discuss with other scientists our work and test it against their experience and insights. To help them see the importance of what we are doing and ensure we are doing it well.

Communication to lay audiences

So far we have described those professional forms of communication which are conventionally and routinely carried out by any scientific programme or organisation. These communications are public in the sense that they are available to people outside the team actually comprising the programme or organisation. They are however usually highly technical communications, and while it is possible to



increases their accessibility to non-scientists, the extent to which can be done well within the scope of these communications is limited. The one exception to this would be newspaper (etc) articles by science journalists that would be inspired by peer-reviewed papers, conference presentations and similar. If we wish to routinely communicate with a broader audience - the non-scientific elements of the funding organisations, agribusiness and plant breeding sector; farmers; the general public; and those in education – we will need a different approach. This audience will require that the scientific level be adjusted to meet the expertise of the audience so we will need to provide more of a summarising digest of the scientific research and progress of the programme. They will therefore be told about the science but in a streamlined way that is meaningful to a non-expert. This will involve the use of appropriate forms of communication and language. This audience will also need to be told why this work is being done in the way that it is – and by implication why it is not being done another way, and they will need an explanation of the programme in terms of its background, its present and its future. Finally the programme should play a role in educating the next generation of plant scientists. The science of the programme is specialised and the capacity of school and higher education teachers to teach it effectively will usually be limited. Material will therefore be produced to support teachers and pupils/students in learning about the science, the new strategies and the technologies of the crop yield programme. This will take the form of factsheets, text-book style reading material, experiments, advanced background material for teachers, on-line web and podcasts, and more extensive on-line tutorials/webinars/seminars and lectures. This should be clearly branded as being a product of the programme but we should liaise with local providers of educational support materials to ensure this material is effectively provided and appropriate to local educational modalities.

Critically in this world trust will first be granted only to the extent that the public feel the organisation (in our case the future crop yield programme) by its nature and composition is trustworthy. The composition and organisation of the organisation and its goals must therefore build trust in the organisation. The foundations of this trust will be laid in this and other deliverables. Trust must thereafter be carefully maintained. Our presentation to the public must explain the facts and what we see to be the implications of these facts, and allow a dialogue about these facts and what they mean. We accept that most people are essentially rational and susceptible to argument, at least to an extent and in accord with their own values; we will not persuade the Zealot to surrender nor change the values of an individual lifetime or of a culture, but within what are reasonable limits



people are amenable and open. Being honest, straightforward and logical, and respectful will get us a long way.

1. Press releases and social media

We see the future crop yield programme in terms of both its existence and its research products as newsworthy. Developments of the organisation and scientific progress and innovation by the organisation should be made known the press, including the conventional media (radio, television, newspapers, scientific magazines, professional or trade publications) and on-line news and science channels and social media. This material should be available in a near to publishable form (ie written and illustrated in a way that the lay person will understand) given the small numbers of science journalists and specialised nature of the programme. This implies that the material may also need to be available as a video clip suitable for use via on-line news sites. These press releases should be distributed via all available routes, including the public relations bureaux of partner organisations, the EU, and other stakeholder organisations. The communications bureau of the organisation will need to establish a good working relationship with all of these outlets as it will depend on them to adapt or edit material for local needs (eg translating text or sub-titling/dubbing video material). For many people social media are replacing the formal print media and their web-based analogues as the vehicle via which they get their news. The use of these new media to distribute press releases in whatever form they take will be an important route to access those people for whom the social media are important.

2. More extensive articles in newspapers, professional or trade publications, webcasts, pod-casts etc.

The communications bureau should be active in developing more detailed articles to describe the organisation, its programme and its research progress. There are diverse opportunities for this. It is important to take every reasonable opportunity to advance the image of the organisation in the way made possible by more extensive articles/webcasts etc. This will require the cooperation of scientists working for the programme. Working with the communication bureau and outside journalists, programme scientists will need to help produce this material. Their contribution this task may be so extensive that they may require some specific training in how to communicate effectively to a non-scientific audience. It is important that the work of the programme is reported in depth, accurately and persuasively.



3. Brochures, factsheets, flyers, informal reports etc

In addition to print and web articles the programme should also produce a range of more formal factsheets, brochures, and reports. These publications will simply at various scales describe the programme and its progress in a format intended for direct delivery to the public or other groups. This is the kind of material than should be available on-line as well as hard-copy to hand out at conferences, exhibitions, during visits, as part of fact-pack sent to schools etc. This material will be one of our primary direct means of communicating detailed information to non-scientific groups and will also serve an educational as well as informative role.

4. Newsletter.

The organisation should have an official newsletter that will describe its recent activities. This will be used to inform the public, professional partners, funders, other interested scientists about our work. It should be available as on-line and hard-copy versions and it should guide the reader to the website and other sources of more detailed information. We can use this to build relationships with our primary stakeholders and the general public and help them engage with other information sources we will produce. The newsletter should be both informative and educational, though with a light touch.

5. Educational material.

We need to educate the next generation of scientists; they need to understand the social human geographic, agro-economic, environmental and climatological background of the programme, why the programme is as it is in terms of science, and social concerns, and of course the science as science. We should have advanced educational material for further training at post-graduate and higher levels. To this, material suitable for school or higher education should be added. While teaching material for the post-graduate+ level can be online tutorials/webinars/lectures supplemented by published papers, the material for more junior need to be more varied. It will take the form of factsheets, text-book style reading material, experiments, advanced background material for teachers, on-line web and podcasts, and more extensive on-line tutorials/webinars/seminars and lectures. This should be clearly branded as being a product of the programme but we should liaise with local providers of educational support materials to ensure this material is effectively provided and appropriate to local educational modalities.



6. The Website.

For most people these days the website will be the portal to all of our communication and other material whether for public access or otherwise. The website must therefore be attractive and logical, and available in all EU languages at least as far as it connects to publicly available material produced in multiple languages. We should ensure that our site is linked to from the sites of partners, partner programmes and stakeholders, just as we should link to their sites. The site will also have password protected sub-domains for confidential material and as detailed elsewhere this will be the gateway to all of the documentation attached to technical reports describing the discoveries and innovations of the programme (WP5.1). Even though these reports will begin as confidential to allow them to be written and checked they should be made public at some stage and when public they will grant full access to the data – the evidence – generated by the programme. The website should also describe the programme, its composition and organisation, its background, current events and meetings, and contact details.