

GREEN PAPER ON THE NEXT GENERATION SEED SYSTEM SEED SYNERGY COLLABORATION PROJECT

About this document

The objective of the Seed Synergy Collaboration Project is the development of a White Paper on a proposed Next Generation Seed System, with a view to achieving consensus on key seed system policy objectives among the key seed sector stakeholders and with government, in 2018. This Green Paper is the first draft of that ultimate document. Between now and then we wish to test these ideas via consultation within the Seed Synergy organizations and with our members and key industry stakeholders and government. In parallel, and with important government support, we are undertaking a comprehensive Economic Impact and Risk Analysis of various emergent change options as we further explore and better understand the implications of the proposals contained within this Green Paper. The Green Paper represents the current state of Synergy thinking as of Fall 2017, and will provide a reference point for engagement activities over the coming months. Engagement activities will help us to refine and finalize our policy proposals for the Canadian seed system and as a result the White Paper may be quite different from this document.

STRATEGIC CONTEXT AND OVERVIEW

Agriculture is a highly competitive, innovative business, and Canadian producers compete in a dynamic, and increasingly integrated global marketplace. Canadian producers of food, feed, fuel, and fibre depend on innovative, quality seeds to increase efficiency, adapt to changing conditions, and drive profitability. Plant science and the seed sector provide solutions to some of our most pressing challenges: building greater food security, adapting to climate change, environmental protection, and farm gate profitability to maintain a vibrant rural Canada. Consumers also benefit from plentiful, high quality, safe, and cost-effective products on store shelves. Agriculture depends upon a consistent and plentiful supply of high quality seed.

The most recent federal budget demonstrates a commitment to innovation and ensuring that Canada is poised to compete and succeed in the global economy of tomorrow. How does agriculture fit into this agenda? The federal government's **Advisory Council on Economic Growth's** Second Report: *The Path to Prosperity*, spoke to the urgent need for innovation-driven growth in its section on "Unleashing the Growth Potential of Key Sectors". A featured sector targeted for major new growth was the agriculture sector. The Council made a series of high-level recommendations for action now:

- Adopt a new and focused approach to sector development, based on removing obstacles and setting bold ambitions in collaboration with the private sector
- Identify a small number of high-potential sectors that would benefit from this approach, based on inclusive growth criteria
- Launch an agfood pilot by convening private and public sector stakeholders, identifying major obstacles to growth, setting an aspiration (a vision and quantified goals), and recommending concrete actions.

The Seed Synergy Collaboration Project is precisely aligned with these recommendations, and is one of the leading agriculture sector responses to the nationwide call to action on innovation.

The competitive position of the Canadian seed industry and agriculture sector is strong, but its potential remains constrained by barriers to entry for new innovation, and the lack of a system and mechanism for facilitating reasonable returns on plant breeding investment to key crop sectors. In addition, while Canada has an excellent national system assuring and tracing the genetic identity and origin of seed in the marketplace,

seed sold as common seed does not provide these benefits, nor contribute directly to the seed system. These factors limit both domestic and export market-driven growth for Canadian producers, and if not addressed will place Canada at a productivity disadvantage relative to its international competitors.

In this context, the case for change is clear. To realize its full potential, Canada needs to rethink the core policies, legislative and regulatory frameworks, and associated institutional arrangements that make up the seed system of today. The rules and practices simply have to change, to deliver a more responsive, transparent, and customer-focused system, and to make Canada an attractive investment market for both large and small businesses. In addition, the industry organizations that currently share responsibility for seed system management with government need to assume collective responsibility (and organize themselves accordingly) for the success of the next generation seed sector.

If we do not seize the moment, we will pay the price down the road. Where new innovation does occur it will too often be slow to enter the market, hurting not just the seed industry, but the entire Canadian agricultural value chain that depends on innovation to remain competitive in a global marketplace. The key industry organizations upon which the seed and agriculture sectors depend for leadership will remain loosely aligned and less effective than they could be, in the process passing on the costs of their lower efficiency and effectiveness to their members and to the sector as a whole. The government will likely continue its ongoing piecemeal withdrawal of support to a seed system for which they will continue to be accountable, while shifting the costs of an increasingly unsustainable model to industry until it collapses under its own weight.

VALUE PROPOSITION FOR THE INDUSTRY

The changes proposed here are motivated by a desire to deliver value and results for the professionals throughout the seed value chain, and beyond. This paper outlines numerous potential benefits associated with the key proposals, but in short we see a next generation seed system delivering:

- Improved profitability, which will in turn stimulate the virtuous cycle of investment needed to deliver a steady stream of new product innovation and growth
- A more efficient governance model for the seed system, where stakeholder organizations work in tight collaboration with each other and government in potentially new configurations
- Regulations that make sense in 2017 and beyond, and that are easier to understand, navigate, and comply with
- A system that better adapts to change, and responds and adjusts to sector needs on an ongoing basis
- A competitive environment that has space for businesses of all sizes to be successful and competitive, not just the biggest players with the most resources

VALUE BEYOND THE SEED INDUSTRY

The proposals and ideas featured here are focused on the seed sector, but their intended benefits extend to the entire agriculture sector, and beyond. We believe that the proposed reforms presented here will offer growers, and ultimately the entire value chain, more choice and better results to drive profitability and growth, and ensure a sustainable agriculture sector going forward. The seed sector needs to change in order to deliver greater value and benefit to its customers, which will enrich all players. The Synergy vision is not designed simply to maximize advantages for seed companies at the expense of agricultural producers.

WHAT DOES THIS MEAN IN PRACTICAL TERMS?

The Seed Synergy Collaboration Project team has defined a clear vision for the next generation seed system, including key characteristics that the future seed system must possess, and the basic functions of the system. This detailed vision is included as an annex to this document, and can be summarized as:

A reformed, industry-led, government-enabled seed system that effectively attracts investment from businesses both large and small, fosters innovation, and delivers new and tailored seed traits to customers efficiently.

How do we get there? This paper provides further detail on specific proposals for the four functions of the seed system – Research & Development, Market Entry & Commercialization, Production & Processing, and Sales & Distribution – and also speaks to the future of value creation and seed sector governance and coordination. The case for change comes down to a set of key goals for strengthening the seed system:

1. A tiered, **risk-based system for safety evaluation and approval** of new plants with novel traits that ensures that Canada retains and improves its standing as a world class regulator in this field and improve its attractiveness to plant technology investment.
2. A unified **industry-managed and government-enabled integrated product registry** providing comprehensive product profiles for the majority of commercial seed, capturing required varietal identity, intellectual property, regulatory, and market information - to replace the current government-run variety registration system and industry-run variety eligibility for certification registry.
3. A unified **industry-managed and government-enabled seed certification function** that consolidates activities currently spread across multiple government and private sector bodies, removes duplication and overlap and provides single window information services for faster introduction of new products to market and facilitation of increasingly sophisticated and important electronic commerce.
4. A **more efficient and adaptive seed certification model** that recognizes: the diversity of the seed industry, the broad spectrum of crop types and associated production challenges, the wide range of business models and production systems; the impact of rapidly evolving seed production and cleaning technology

and the need to rapidly adjust rules and procedures to align with other jurisdictions, capture market opportunities and reduce cost pressures.

5. A seed quality/standards system where the **majority of sold seed is situated on a progressive spectrum of varietal identity and purity standards**, from the most basic to the most stringent for the full range of markets and intermediate and end users, and where common seed use becomes a key performance indicator of commercial producer lack of support for and lost returns to the seed system.
6. A **new value creation model** which recognizes the disproportionate costs of product development borne by pedigreed seed developers and producers relative to common and other seed sellers and beneficiaries. This model would increase certified seed use and related revenue flows, and channel additional revenues generated by royalties, check-offs or matching government funding to the principal risk takers and innovators that contribute to trait and varietal development and their market success.
7. **Maintenance of Canada's strong genetic identification and traceability advantage**, underpinned by an integrated product registry and seed certification function that facilitates both rapid introduction, and where necessary, removal, of new varieties.
8. **Enhanced capacity and support for the introduction of new crop types** into the certified seed mainstream to maintain and expand Canada's position as a world leader in this area.
9. **Enhanced capacity and support for industry and government** efforts to manage phytosanitary and low-level presence (LLP) related export market challenges.
10. **Enhanced capacity and support for international standard setting, building and facilitating international partnerships and cooperation**, for international business development and for building Canada's international standing as a centre of excellence in plant breeding, seed production and seed system design and development.
11. **More cost-effective governance of the seed system overall**, to sustain these reforms, to better coordinate priorities across the seed and agricultural sectors, and among government, industry, and academia to enable responsiveness to crop value chain needs, as well as broader societal considerations.

12. Examine the merits of an **anchoring organization that would perform many of the functions proposed herein**; this could take the form of a single organization or a formal network of organizations or parts thereof.

WHERE WE ARE AND WHERE WE ARE GOING

This paper represents the completion of **Phase 1** of the Seed Synergy Collaboration Project: build relationships amongst the Synergy organizations, define and achieve broad-based consensus on a high-level vision of the next generation seed system, and translate that vision into an initial set of proposals. These proposals are our starting point for testing and further elaborating a vision for the seed system, and they are intended to provoke discussion. In many cases how these ideas will be translated into specific actions remains to be determined; this is by design and will be part of the objective of the next phase of the project.

Next – in **Phase 2** – we will focus on consultation and analysis. We will **consult** with seed association members, other stakeholders, partners, and government to test these proposals, uncover oversights or opportunities, and work out in greater detail whether these are the right objectives and, if so, how to make them a reality. These groups possess an enormous amount of knowledge and insight, which we will leverage in building the strongest possible case for the next generation seed system. This paper is not intended to be the last word on these ideas.

As part of phase 2, we will conduct further **analysis** of these proposals through an Economic Impact and Risk Analysis study. Supported by the government of Canada, this study will examine the seed sectors of both other jurisdictions and our own in more detail, and will conduct impact assessments of the change options.

Details Matter

Through consultation and analysis we will develop, in Spring 2018, a final White Paper with a strong vision, and answers to key questions like:

- How can these changes help reduce costs or create additional value for seed companies, professionals, and their customers?
- What economic benefits can Canada expect from attracting greater investment?
- How would an anchoring organization work in practice? What functions could or could not be migrated to such an organization?
- What type of specific value creation model should be adopted in Canada?

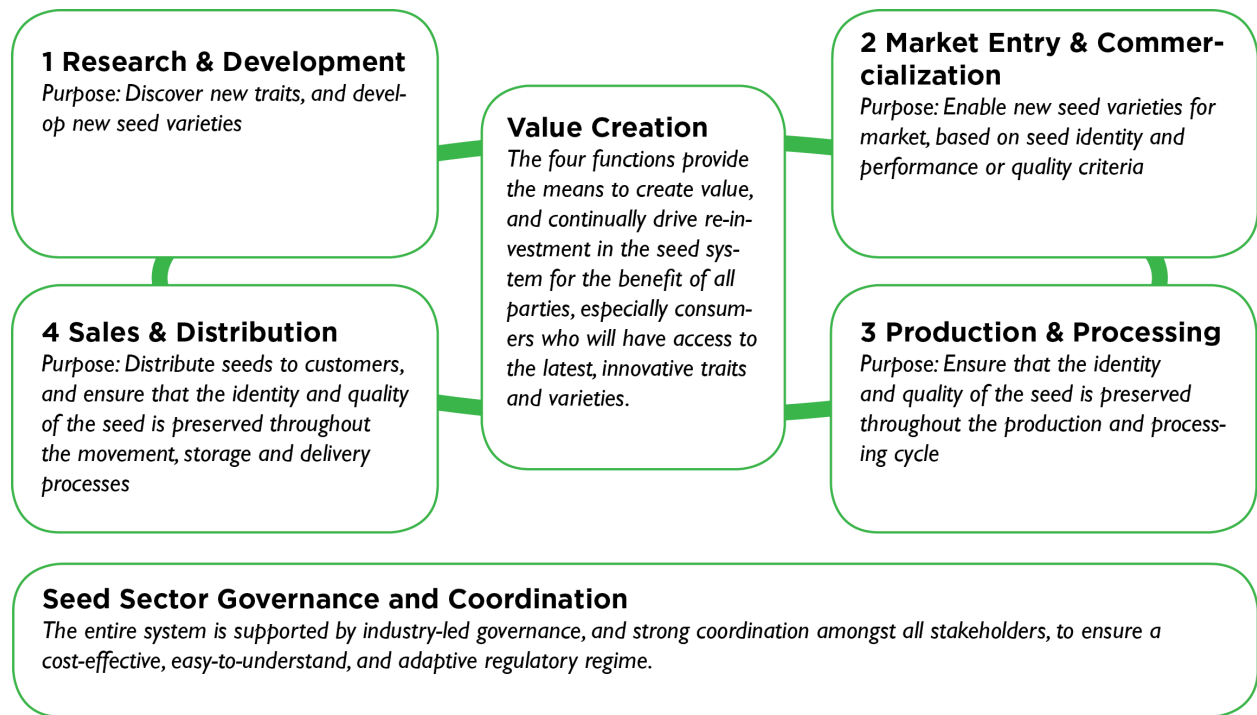
WHO ARE THE SEED SYNERGY ORGANIZATIONS?

The Seed Synergy Collaboration Project consists of six major national seed industry organizations: the Canadian Seed Growers' Association (CSGA), the Canadian Seed Trade Association (CSTA), the Canadian Seed Institute (CSI), the Commercial Seed Analysts Association of Canada (CSAAC), the Canadian Plant Technology Agency (CPTA) and CropLife Canada.

FUNCTIONS OF A NEXT GENERATION SEED SYSTEM

Seed is the starting point from which food, feed, fibre, fuel and other products can be produced, to provide great benefits to society.

A Next Generation Seed System in Canada would have the following functions:



The following pages deal with more detailed analysis and proposals for each of these functions of the next generation seed system.

RESEARCH & DEVELOPMENT

Research & Development - Purpose: To discover new traits, and develop seed varieties. Research & Development encompasses all activities required to develop new or improved seeds (e.g. trait discovery and variety development, seed applied technology, etc.) for minor and major crops domestically and internationally.

Context and Case for Change

Plant breeders are in the business of identifying and introducing new traits into new varieties with improved agronomic characteristics, end-use quality, and pest tolerance traits. Today we have access to plant breeding tools that are more precise, efficient, flexible and cost effective than ever before, creating excellent opportunities across the entire seed sector, and benefitting the entire agriculture sector.

Government plays a role in ensuring that new products are safe, as Canadians would expect. However, government approval of new varieties is effected via a system – under the Seeds, Feeds and Food and Drugs Acts and their respective regulations – that triggers risk assessments based on novel traits. And yet novel traits are the entire purpose of any plant breeding program. This results in potentially every new variety, regardless of relative risk, being subject to the same standards of government review, field testing, and approval.

In general Canada's focus on novelty – and not regulating new products strictly on the basis of the process by which they are created, as other jurisdictions have done – is the right regulatory approach. Many of our international competitors have struggled with systems that regulate based on breeding or selection techniques (i.e. rDNA or genetic engineering), not the end result, and increasingly similar products can be created via multiple techniques. Canada's fundamental framework is strong, but how it is implemented needs to be improved. We recognize Canada's excellent safety record, and this is a major competitive advantage for the entire industry. In designing appropriate levels of regulation and oversight the Seed Synergy vision is in no way suggesting any compromise with respect to safety.

Currently, safety regulatory triggers and requirements are unclear and poorly understood by government and trait and variety developers alike. As a result, well-meaning risk aversion has crept into the system. This means that regulators have developed an understandable practice of applying the same regulatory process and standards to all products – regardless of their inherent qualities or risk – and it means that the regulatory system has expanded to include information about properties that do not actually relate to the environmental, feed and food safety assurance mandates of the regulator. Innovators are subject to unnecessary regulation, face too high a burden, and often do not know what processes they need to follow in order to seek regulatory approval approvals from the CFIA and Health Canada.

Ultimately the innovative potential of the Canadian seed industry – and the value it creates for the agriculture sector – is limited by the application of a regulatory regime more focused on

process than good outcomes, and Canada risks losing out on important investment as small operators simply cannot afford to engage in uncertain regulatory processes, and multi-national companies choose to do business in jurisdictions with more predictable regulatory processes.

Proposal for Research & Development

We propose a reformed system for the regulation of plant science innovation safety that is based on risk. What does this mean? It means that in the future the very first question asked of a new variety proposed for use in Canada would be: what level of risk does this product entail and what level of regulatory review and testing is appropriate to that projected risk? On that basis the regulatory authority would clearly communicate to an applicant the path toward a regulatory approval decision.

For some products – e.g. those with traits that differ only slightly from already-approved varieties – the path to a regulatory decision would be streamlined, and significantly more efficient than that of today. For others – e.g. those that are markedly different than existing products – the path would be as rigorous as is required to protect the public and the environment.

In this proposal government would continue to oversee the safety regulatory system. There is no question that government plays a vital role in this space, and that its authority is critical for maintaining trust in the Canadian system overall. The seed sector would play a larger role in working with government to define regulatory standards, and most importantly to ensure that regulatory requirements are focused on assuring safety, and not on other, tangential qualities.

This is not a proposal for compromising on safety. It is a proposal for a regulatory system that continues to deliver world-class safety outcomes, while operating more efficiently, and better involving sector experts in working toward shared goals. Moving in this direction will make Canada a destination of choice for investment, enable better products growing in our fields and available on our shelves, and enable economic growth throughout the agriculture sector. In addition, a more transparent and risk-appropriate regulatory regime will better enable small, medium, and large players to innovate in Canada, rather than being limited to only large corporations with the resources sufficient to risk the current regulatory system.

RESEARCH AND DEVELOPMENT SUMMARY

- Regulatory approval requirements today are unpredictable, require more information than is necessary to deliver a good outcome, and treat every innovation the same, regardless of risk.
- We propose a new, risk-based assessment model, that sets regulatory requirements commensurate with the projected risk of new products.
- Government will continue to lead oversight of the system, and government-sectoral coordination needs to be enhanced to define regulatory standards that make sense.

MARKET ENTRY & COMMERCIALIZATION

Market Entry & Commercialization - Purpose: to enable new seed varieties for market, based on seed identity and performance or quality criteria. This can include processes around variety registration, Plant with Novel Trait requirements, Intellectual Property Rights applications, stewardship requirements, and more.

Context and Case for Change

Research & Development (above) is focused on the process by which new varieties are evaluated by government against standards designed to ensure human and environmental health. Market Entry & Commercialization is the next step, and it deals with important considerations beyond safety. This is where an exciting innovation becomes a viable product.

Today, bringing a new seed product to market involves a web of rules and organizations, looking at many facets of the product: variety registration (if required, and subject to distinct and different variety testing by crop), Plant with Novel Trait requirements (as previously described in the Research and Development section), Intellectual Property Rights applications (Plant Breeder's Rights or Patents), stewardship requirements, designation to grain class and multi-country market qualification, and nutritional specifications. Variety registration and variety eligibility for certification are managed separately, by government and industry, respectively. This, like many other aspects of the management of the seed certification system, is inefficient.

The seed sector (in no small part because of its splintered organizational structure) has played a too-limited role in influencing and determining these standards, leaving government to manage a variety registration system that despite multiple prior attempts, needs further reform and potentially replacement to ensure that it can respond in a more timely way to the Canadian agriculture sector's evolving needs. Surprisingly government still plays a significant role in deciding what products – even after they meet safety requirements – can come to market. As a result the system tends to adapt slowly to changing conditions and emerging technologies, and the sector (particularly crop value chains) does not play a coordinated role in ensuring adaptation to change.

WHAT IS "ALL" SEED?

In this paper we regularly talk about all seed, but what do we mean? In this paper "all seed" means the agricultural field crop seed products that are today a part of the certified seed system, as well as the equivalent common seed products for those crop kinds. These are seed products grown and offered for commercial sale.

We are not talking about farm-saved seed, nor do we mean "all seed" to include vegetable, flower, herb, and other such seed products. Looking into the future one can imagine a system that might include minimum standards for accurate species labelling or freedom from prohibited noxious weed seeds for truly all seeds. However a vision like this is out of the scope of this paper; the Seed Synergy vision is limited to the species and crop kinds that fall under today's seed system.

Navigating this system is difficult and time consuming, not least because different requirements are administered by different organizations or parts thereof, like the Canadian Seed Growers' Association, the CFIA's various branches, the Canadian Seeds Institute and more. Often these different organizations – some government, some not – are only loosely coordinated even though they are jointly responsible for the functioning of the seed system. Not surprisingly, this creates headaches and added costs for both regulators and regulated parties.

Proposal for Market Entry & Commercialization in the Next Generation Seed System

We propose three major changes for the Market Entry & Commercialization function.

First, that the seed sector assume leadership of the regulation of quality for use where continued regulation is required as well as other requirements that are not safety-related. This will include working to assure that the system adapts much more quickly to new technologies and other drivers pushing regulatory boundaries on an ongoing basis. Crop value chains need to play a larger role in defining information requirements and regulatory standards that make sense, particularly as new technologies begin to challenge current regulatory and operational models.

Second, using the industry-led model described above, Canada should implement a new integrated product registry providing comprehensive product profiles for the majority of commercial seed, capturing required varietal identity, intellectual property, regulatory, and market information. This single, integrated system would replace today's government-run variety registration system and industry-run variety eligibility for certification registry. Implementing a product profile system is not just about consolidating information in one place, it is about reengineering the underlying systems and processes to be more efficient and less burdensome for innovators and to better enable and facilitate efficient commercial transactions.

Third, that all of the players involved in the regulatory system – both public and private sectors – work to create a single, secure, online system for the provision of all information required for regulatory review and approval, once and only once. Today's system, requiring multiple, energy-intensive inputs to multiple organizations just does not measure up. A user-friendly, online interface for the submission and exchange of information is a must-have, not a frill. Building such a system will require the various organizations to work together to achieve an experience for users and regulators alike that works, saves time and resources and reduces aggravation.

It is crucial to note that, while we would expect the system of the future to drive an increasing proportion of Plant Breeder's Rights – protected varieties, registered through a single window, this does not mean that we advocate a one-size-fits-all approach to information requirements. Products at different stages of development, and seeking different levels of intellectual property protection would demand differing levels of information. A single window for data does not mean a single approach for all products.

PRODUCT PROFILE EXAMPLE

Variety Name	Brand	Crop Kind	Type
Canadian Distributor	Breeder		Intellectual Property Features

VARIETY INFORMATION

Grower Use Description

Area of Adaption

Determined by registration or value chain recommendations

Agronomic Characteristics

Significant growers features, such as maturity rating, herbicide resistance, disease reaction, etc.

Grower Requirements

Stewardship requirements such as requirement for refuge areas

Restrictions for Grower Use

Market Acceptance Description

Crop	Marketing Class	Subgroup	Trademarked Value Chain
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Market Features

<i>Best fit</i>	<i>Intermediate user qualities</i>	<i>End-use qualities</i>
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Market Constraints

Domestic	Export
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Enhanced Use Descriptions

Seed Production Requirements

<i>Phenotypic description required to remain true to variety</i>	<i>Laboratory testing required prior to sale</i>
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MARKET ENTRY & COMMERCIALIZATION SUMMARY

- Current regulations and requirements outside of safety – intellectual property, variety registration, stewardship – are difficult to navigate, administered by multiple agencies, and the rules are slow to adapt to change.
- We propose a leadership role for the sector in setting cutting-edge standards and ensuring processes make sense for users, and particularly a greater role for crop value chains in defining requirements and regulatory standards.
- We propose replacing the current variety registration and variety eligibility for certification regimes with an integrated system, anchored in a product profile for all approved seed products, containing all regulatory and commercial information relevant to that product in one, easily accessible place or virtual space, with access to confidential business information about a product limited to those granted explicit access to it.
- We propose a single online front end for the submission of data for all regulatory and quasi-regulatory approval processes associated with market entry.
- We propose that pre-market assessment of varieties for cultivation and use remain an option in some form, where respective crop value chains require it.

PRODUCTION AND PROCESSING

Production & Processing - Purpose: ensure that the identity and quality of the seed is preserved throughout the production and processing cycles. This includes the inspection and certification of seed crops, and the oversight of processing and testing facilities.

Context and Case for Change

Production and processing is about ensuring that the identity and quality of the seed crop is preserved throughout the production and processing cycles. Here, the system has a clear limitation: while pedigreed seed is subject to rigorous production and processing standards, common seed is not. Moreover, in recent times common seed has been largely excluded from priority regulatory oversight because of evolving government priorities and retrenchment in areas deemed low risk from a health and safety perspective. In many cases, this has resulted in a buyer beware market and an avenue for large-scale illicit transactions that infringe on intellectual property rights of public and private breeders alike.

Does that mean that the current pedigreed seed grade and model should be mandatory for everyone? No. The seed sector needs choice, guaranteed minimum quality assurance, and a fair playing field for all players. This means finding a balance that works for everyone. Exactly what form that balance will take is one of the largest questions facing the Seed Synergy Project and the agriculture industry more generally.

In addition, looking at how production and processing is managed today, we see that the CFIA is the overall seed authority in Canada. However, over the years CFIA has progressively delegated more and more components under its authority to various parties throughout the system. CSGA certifies high generation seed, prescribes the seed crop production standards, determines varietal eligibility for certification

PEDIGREED AND COMMON SEED

The Seed Synergy organizations represent interests largely integrated into the pedigreed system of today, and we understand that some might view many of our proposals as seeking to demonize common seed, or to force all of the seed sector into the pedigreed system. We wish to be explicit: this is not our goal. We fully recognize that common seed today plays an important role in the agriculture sector, and that some consumers choose common seed because it best meets their needs – most particularly because it is often less expensive than pedigreed seed.

Our proposals aim to create a system that provides choice for consumers, and that enables a fair return on investment so that Canada's agriculture can continue to benefit from cutting-edge plant science innovation. What we call common seed today has a place in this future, not as a separate class, but as an integrated part of a sustainable and vibrant seed system. This paper is about finding ways to bring the pedigreed and common seed markets together under a single roof, not about creating a conflict between the two models. We need to find economically and administratively viable ways to have common seed sales contribute to value creation for the sector. This paper should in no way be construed as an attempt to put today's common seed producers and sellers out of business; both the common *and* pedigreed models of today need to adapt for us all to succeed.

Ultimately, it is our sincere belief that a next generation seed system that accommodates all parties, while enabling reasonable value creation for innovators, will benefit everyone in the seed system, and the agriculture sector at large. Moreover, innovation will create positive incentives for consumers to choose intellectual property protected products because of the benefits they offer.

and certifies seed crops. Seed labs and their accredited analysts, CSAAC members, conduct official germination and purity tests on seed. CSI, on behalf of CFIA, provides oversight of the seed labs, seed facilities and personnel who clean, process, import, and label certified seed with the CFIA's official seed certification labels. And the Agrichemical Warehousing Standards Association used by CropLife prescribes and enforces a voluntary seed treatment standard.

The overall quality of outcomes in ensuring seed quality and identity throughout the production and processing cycle is very high. Canada is internationally recognized for its high quality seed program, and we enjoy trust and confidence in international markets. But as government has delegated various authorities to industry players, it has not similarly delegated resources to fund those activities. In the previous generation the seed system was broadly underwritten by public funds. The resources dedicated to supporting the seed system have been significantly reduced or withdrawn completely over the last 30 years but the system design has changed little and a reduced work force contingent is still labouring to perform the same functions, often in the same ways, and at higher unit costs. As a result, needed work does not get done in a timely way or in many cases at all.

The impact of this devolution comes into sharp focus when looking at crop inspection. Where once the federal government provided virtually all crop inspection services at a relatively low cost that was uniform across the country, now those services are performed primarily by the private sector. While often more timely and responsive than in the past, prices on average are 3-5 times higher. In areas of high density, where an economy of scale exists, this arrangement is workable. However, in more remote areas, where volume is lower and unit costs higher, prices can be 10 – 15 times higher than previously and the scarcity of inspectors can create a limit on the productivity of an entire producing region. Consequently creative solutions are needed if pedigreed seed production is to remain viable in these regions.

Proposal for Production and Processing in the Next Generation Seed System

We propose three areas of change for the Production and Processing function.

First, that all seed sold in Canada – listed in a product profile as discussed in the previous function – will eventually be subject to varietal identity and purity standards. This would occur simultaneously with diminished use of common seed as a result of new higher performing and intellectual property-protected varieties replacing older varieties. Achieving this could include revisiting the current pedigreed vs. common distinction and the consideration of a shift towards a system that has a broader range of certification options including common seed production and sale.

Second, interested and qualified seed companies and growers would be provided greater ability to employ comprehensive in-house approaches to producing pedigreed seed by replacing external 3rd party inspections with internal quality management systems and an ex-post 3rd party audit framework. The current system of external third-party crop inspection

would continue to operate for those for whom it makes business sense. In high-cost remote areas, the option of QMS approaches could offer a more cost-effective alternative to the status quo for some. Implementing this change will require careful adherence to international standards and practices. We operate in a global market, and nothing in this specific proposal is meant to in any way detract from Canada's high standards or compromise our ability to compete in foreign markets.

Third, that mechanical purity standards that currently result in seed crops being demoted or rejected for certification be applied conditionally where seed cleaning capabilities allow for removal of mechanical impurities to meet grade standards.

PRODUCTION AND PROCESSING SUMMARY

- Today's pedigreed seed system needs to be made more flexible and responsive to evolving technology, production practices and market opportunities.
- We propose a modernized pedigreed seed system that will facilitate an increase in pedigreed seed use and a reduction in incentives for common seed production, as new high performing protected varieties replace older ones.
- We propose an expansion of options for producing seed under comprehensive quality management systems that do not require third party crop inspections but which are backed by third-party audit frameworks.
- We propose flexibility in the application of crop production purity standards where seed cleaning capabilities can be employed to meet grade standards.

SALES & DISTRIBUTION

Sales & Distribution - Purpose: to distribute seeds to customers, and ensure that the identity/quality of the seed is preserved throughout the movement, storage and delivery processes.

Context and Case for Change

Sales are the goal of any production system, and seed is no exception. In the seed business, the most important factors driving sales are price, quality and trust, and the current system for pedigreed seed production and sale has facilitated the widespread availability of high quality fairly priced seed that consumers trust and depend on.

However, the predominance of pedigreed seed varies tremendously by crop type and in cereal production in particular it is relatively low, with common seed sales predominating. So, while return on investment for and traceability of seed is very good for corn, soybeans and canola, it is much less so for many varieties of wheat and other cereal crops. As a result, the ability of breeders to fully benefit from their innovations on the cereal side is constrained and the ability of the system to facilitate traceability is more limited.

Furthermore, because seed sales are transacted in myriad ways, it is difficult and resource-intensive for intellectual property rights-holders to protect their properties. No one in Canada desires a government enforcement agency overseeing all seed sales; markets are at their best when their transparency allows buyers and sellers to use existing tools to ensure fairness. Making this a reality for seed in Canada – without a heavy-handed government presence – will require us to find new ways to build a more transparent seed marketplace.

Proposal for Sales and Distribution

We propose a seed sale listing system, whereby everyone in Canada who wishes to sell field crop seed, of any type, must register the sale in an easy to use system (linked to the entire certification system). In this system all seed sold would be subject to some minimum information requirements. A seed sale listing will feature, at minimum, a basic declaration attesting to a seed lot's identity and quality, all the way through the full available certification information (using information from the product profile described in Market Entry & Commercialization).

With this information more available, data holdings can be leveraged to produce high quality profiles and analyses, enabling better risk management, product recalls, and facilitating more efficient commercial transactions at lower costs. Importantly, the sector and crop value chains must be involved in determining traceability goals and characteristics, so that the system remains efficient and focused on outcomes of relevance to them. Much of the focus of the system described here is about getting desirable new varieties into production. At the same time this system overall – and the seed sale listing system in particular – would allow for efficient management and removal from production of unwanted varieties. Knowing exactly what is

being grown and sold, and where, would give Canada unprecedented potential to act quickly in replacing compromised varieties and assuring customers.

How would a seed sale listing system work? A useful example is the MLS system which tracks and records real estate sales, offering a set of open data to consumers, and further information for specialists with proper access credentials. Such a system is useful to buyers, sellers, and regulators, as it creates a transparent data set to help understand the market and design interventions when and if necessary. In essence, a seed sale listing would be analogous to this type of design. A future seed professional might scan a barcode with a smart phone, answer a few simple questions in real-time, and easily create a public listing.

Such a seed sale listing system, which builds on many of the elements of the other functions, could ultimately be used to help the sector create value from all seed sales. This issue is discussed in more detail in the Value Creation section below, but in the seed listing system we can see a path forward. For example, if the seed sale listing system included a declaration of origin we would have a readymade vehicle for value creation. This is not to say that we should take such an approach, but to point out that solutions are possible. At the very least a seed sale listing system would allow intellectual property owners to more efficiently assert their rights.

SALES AND DISTRIBUTION SUMMARY

- Not all seed sold in Canada is of known identity or quality, buyers may be assuming liability of which they are unaware, and value creation opportunities are limited in many areas.
- We propose a universal seed lot listing system, where seed available for sale is listed, along with at least a declaration of identity and quality.
- Doing so will strengthen and expand the traceability that is today a core of the pedigreed seed system, to all seed sold in Canada.

VALUE CREATION

The Linchpin of the Seed System

The foregoing proposals offer up a detailed and comprehensive vision for the next generation seed system. These proposals cover everything from regulatory approvals to enhancing the seed sector role in governance. However, the largest issue facing the seed system and which touches every function and every player, is the ability of plant science innovators to generate value and returns on the investments that fuel the seed sector.

Solving the value creation puzzle is probably the most complex and potentially divisive element of the future seed system, as it may require changes to long established practices. Government and agriculture sector leaders are working now to develop recommendations on value creation solutions and Seed Synergy Project members are engaged in this process.

To this point there is consensus among the Seed Synergy partners that any **new value creation model** will need to address the disproportionate costs of product development borne by variety developers and pedigreed seed producers relative to common and other seed sellers and other beneficiaries. Any new model would ideally increase certified seed use and related revenue flows, and channel additional revenues generated by royalties, check-offs or matching government funding to the principal risk takers and innovators that contribute to trait and varietal development and their market success.

Any future seed system must address this fundamental issue in order to be sustainable. Without effective and efficient means of value creation Canada's seed system will become less competitive, productivity will diminish and we will settle into being a nation of innovation-takers, not innovation makers, to the benefit of our competitors.

We believe that the proposals detailed in this paper can, if carefully developed, refined, and ultimately implemented, contribute significantly to enabling successful value creation and profitability, through:

- A more responsive and risk-based regulatory system that reduces unnecessary compliance costs
- A governance model that places the sector and value chains in design and decision-making leadership roles
- A modernized pedigreed seed and associated value creation system that enables technology transfer and innovation, particularly in the cereals sector, and drives economic growth
- A seed sale listing system that brings increased transparency and utility to seed sales across the country, and allows for more efficient protection of intellectual property rights and commercial transactions

SEED SECTOR GOVERNANCE AND COORDINATION

Changing how we work together

A common thread underlying many of the proposals put forward in this paper and a clear point of emphasis during Seed Synergy Collaboration Project discussions is the need for greater coordination among the six Synergy organizations, and with government.

The current diversity of responsibility centres across government, academia and industry organizations needs to be better coordinated or integrated, and refocused on key sector priorities. The human capital thinly dispersed across these organizations, departments and agencies needs to be concentrated in core networks and/or organizations to restore lost critical mass, increase effectiveness, and lay the foundation for sound succession planning and capacity building where it is needed most. Today's organizational model simply spreads too few resources too thin over too wide an area of responsibility and accountability. Real and significant organizational change will almost certainly be required of the Seed Synergy organizations.

The six organizations – Canadian Seed Trade Association, Canadian Seed Growers' Association, the Canadian Seed Institute, the Commercial Seed Analysts Association of Canada, the Canadian Plant Technology Agency, and CropLife Canada – play largely complementary, rather than overlapping, roles in the system of today. Nonetheless, in examining the case for change we have highlighted a simple fact: the system of today is fragmented. No one starting with a blank slate would design the private and public organizational divisions and responsibilities as they exist today. Having many organizations means that coordination can be limited, overall administrative costs are increased, information sharing is constrained, and the voice of the sector is diluted.

Our vision does not rely on a specific organizational model to achieve. It does require long term and close collaboration, as well as integrated systems and approaches. This could take the form of a new consolidated seed organization, or a more formal network of the current institutions, working through a new public-private partnership arrangement in conjunction with government, academia and NGOs.

Changing how we organize seed sector governance is also a critical enabler of the overall vision of an industry-led, government-enabled seed system. In this paper we've discussed proposals for delegating greater authority from government to the seed sector. To do so, government needs a formal partner; a "sector" cannot assume responsibility, only an organization can. And we do not want to further the piecemeal delegation of authorities that has led to the creation of six seed organizations in the first place. As a result, industry integration is a necessary condition for the realization of the Seed Synergy vision.

Proposal for Seed Sector Governance and Coordination

First, we propose **greater coordination across the seed sector**, including government, industry and academia, for the determination of priorities. This is not a proposal for organizational change *per se*, but rather for communication and coordination that can begin now.

Second, and in support of the above proposal, we suggest that the six Seed Synergy organizations work immediately to **coordinate their advocacy agendas and activities** to the greatest extent possible, in order to present a single united voice to government, and to amplify the voice of the sector. This will entail specific action and coordination amongst senior leadership to ensure that all of the diverse voices within the sector are heard under a common banner, and not just bland compromise for the sake of getting along.

Third, we propose that we examine how a future seed system might be anchored by a **central organization or network of organizations** working through a new public-private partnership arrangement. Such an organization (imagine a single Canadian Seed Association) or cluster (imagine a formal Seed Network) could integrate many of the key policy analysis, program development, regulatory functions, member services activities, education and promotional activities, public relations work, training and development, and administrative services currently embedded in a number of existing industry and government organizations.

SEED SECTOR GOVERNANCE AND COORDINATION SUMMARY

- Today's governance structure is fragmented, and divides scarce resources amongst too many unique organizations.
- We propose increased coordination amongst all seed sector players on priorities, beginning immediately.
- We propose that the six Seed Synergy organizations coordinate and harmonize their largely complementary advocacy agendas, to amplify the voice of the sector to government.
- We propose the serious examination of a permanent change to the enabling organizational structure of the sector, that would see either a single organization, or a formal cluster, take on greater responsibility for seed sector governance.

ANNEX - THE DETAILED SEED SYNERGY VISION

The proposals noted above, are all in the service of this vision, which defines how the Seed Synergy team views the next generation seed system.

<p><i>Canada’s seeds have the following attributes:</i></p> <p>Choice The system encourages a diversity of seed kinds, varieties, and suppliers.</p> <p>Quality The system ensures all sold seed in Canada is of known quality.</p> <p>Safety Through good stewardship, the system continues to ensure that all seed is safe for humans, animals and the environment.</p>	<p><i>The Next Generation Seed System in Canada is structured and organized to deliver value and predictability for the entire value chain:</i></p> <ul style="list-style-type: none"> • A strong, competitive and profitable sector that attracts investment, research and innovation, and that is valued for its significant contribution to society. • An industry-led system that is cost-effective, market driven, agile and responsive, and that enables Canada to do business globally. • A system that meets the needs of all stakeholders along the entire value chain. • A system that instils trust and that garners a high degree of support.
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A Next Generation Seed System in Canada will have the following characteristics:

Innovation and competition

The system fosters continuous improvement through innovation and drives choice and competition. The system enables Canada to be competitive on international markets.

Industry-led and government enabled

The system is managed by the private sector and supported by government; it fosters accountability for all players.

Science-based

The system is built on strong scientific and technical foundations.

Value to industry and customers

The system delivers greater value to the seed sector and to customers across the value chain, provides great value at a reasonable cost and ensures viability for the industry.

Responsiveness, agility and adaptability

The system is simple and easy to navigate. It is responsive and adapts to emerging issues, market needs and technology in a timely manner. It responds to customer requirements and meets the evolving needs of domestic and international markets.

Harmonization and international leadership

The system enables Canada to take a global leadership role, and facilitates market access by aligning with other national systems.

Transparency

The system is transparent to the seed sector and the public.

Respect for Intellectual Property

The system fosters compliance with intellectual property obligations in order to foster innovation and attract investment.

Traceability

The system facilitates seed varietal traceability across the seed value chain.

Human Capital

The system encourages ongoing professionalization of the seed sector, through continuous training and education.