WORKING TOWARD SUSTAINABLE DEVELOPMENT: CONSULTING TO THE ECO-SYSTEM

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ABSTRACT

We argue that in order to address the contemporary challenges that organizations and societies are facing, the field of organization development (OD) requires frameworks and skills to focus on the eco-system as the level of analysis. In a world that has become economically, socially, and technologically highly connected, approaches that foster the optimization of specific actors in the eco-system, such as individual corporations, result in sub-optimization of the sustainability of the natural and social system because there is insufficient offset to the ego-centric purposes of the focal organization. We discuss the need for OD to broaden focus to deal with technological advances that enable new ways of organizing at the eco-system level, and to deal with the challenges to sustainable development. Case examples from healthcare and the agri-foods industry illustrate the kinds of development approaches that are required for the development of healthy eco-systems. We do not suggest fundamental changes in the identity of the field of organizational development. In fact, we demonstrate the need to dig deeply into the open systems and socio-technical roots of the field, and to translate the traditional values and approaches of OD to continue to be relevant in today's dynamic interdependent world.

Keywords: Eco-system design; socio-technical design; sustainable development; cross-discipline intervention; digitally enabled organization; health care design; supply chain design

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INTRODUCTION

Rapid advance of technological knowledge and capabilities and the associated unfolding of the globally connected economy have combined with acceleration in the growth of the earth's population to yield unprecedented opportunities and intractable problems for humanity and the earth. This directional tension was captured in the UN World Commission on Environment and Development's Brundtland Report in 1987 (United Nations, 1987). Its goals were multilateralism and interdependence of nations in the search for a sustainable development path. Sustainable development was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Global commitment to sustainable development has been extended and expanded in the UN 2016 Sustainable Development Initiative (2016). It is the premise of this chapter that the field of organization development (OD) can be a major contributor to sustainable development. To do so will require orienting our activities and frameworks to deal with the increasingly interconnected nature of the world we live in and the extent to which advanced technology is redefining the way we live and work. We argue that eco-systems rather than the individual organizations are becoming the level of analysis and intervention that can address the challenges faced by humanity and the earth.

Recent decades have been characterized by unprecedented wealth creation, and large segments of the global population have been pulled out of poverty. These economic outcomes have been driven in part by new forms of technologically enabled organization that allow coordination, communication, control, and the generation of wealth on a global scale. Yet, growth in prosperity for many has not yielded increased sustainability. There has been an alarming escalation in wealth inequality, social unrest, and associated geo-political uncertainty and instability, environmental degradation, and the ravages of climate change. Advanced technology has led to an era of intelligent automation that is advancing productivity and delivering value. At the same time that it enables new business models, it disrupts and threatens many established businesses, and changes work systems in ways that are obsoleting skills, displacing workers, and, some believe, leading to an even greater wealth gap and perhaps to massive unemployment (Davenport & Kirby, 2016).

In this context, the need to address both the sustainability and development aspects of human progress evokes both the traditional emphasis on human development that is the key underpinning of OD, and its traditional focus on both the social and technical aspects of work and organization. Yet, dealing with today's development challenges will require OD to expand the scale and scope of the application of its frameworks and methodologies to deal with challenges that extend beyond the organizational health of single organization systems. Although slowly changing, many of our models and interventions have been applied primarily with the individual organization as the unit of analysis

and the instrument and locus of economic and human development. The field has had great impact in helping corporate leaders integrate their business strategies, values, organization designs, technologies, and team and individual capabilities and outcomes in pursuit of growth, wealth generation, and competitive success. Progress in generating wealth and in achieving human development has been made one organization at a time, while impacts on the larger eco-system have often been viewed in OD, just as in economics, as externalities. Our premise is that intervening at the eco-system level – a level that turns organizational externalities into focuses of action – is increasingly important.

In reality, OD has always recognized that organizations are open systems, and organizations have been increasingly operating across boundaries for decades. Yet there has primarily been an organization-centric view of goals, outcomes, and relationships, often with the perspective that how well the organization performs depends on its ability to exploit the resources in its market context. That context has been characterized by continual advances in communication and information technology that have enabled new ways of doing work, accessing resources and knowledge, collaborating and coordinating, and wielding power across organizational boundaries and geographies. These technologies have fueled new business models in which organizations design cross-organizational supply chains, alliances and partnerships, and new, often virtual, forms of connection with customers and vendors. The advances of big data, smart-automation, and work systems based on powerful and far-reaching digital platforms are leading to changes in business models that reflect convergence and networking between organizations and across industries, new ways of interfacing with customers and suppliers and other stakeholders, and new conceptualizations of work systems and of employment. Largely because of ownership and governance structures, strategists, corporations, and organization design theorists continue to focus on the optimization of the organizational system, even while companies' operating models are increasingly boundary less. They have understood the use of approaches such as partnerships, alliances, outsourcing, and the use of contractors as a way of securing resources and leverage to increase company competitiveness and profitability of the focal firm.

In the world of organization theory, this is starting to change. In this increasingly technologically enabled world, organizations are being conceptualized as components of eco-systems in which a number of organizations and stakeholders work together in networks. Multiple firms collaboratively and competitively are creating and sustaining new markets, products, and services, each in order to achieve their purposes (Teece & Linden, 2017). We define eco-system as many others have: as an interconnected system consisting of living organisms, social entities, and non-living elements of the environment. Although both corporations and OD practitioners have been slow to make this leap conceptually and in practice, the relevant level of analysis for assessment of value delivered to stakeholders and for intervention, design, and optimization is, increasingly, the eco-system.

Many trends in today's world, not the least of which are the increasing social and environmental unsustainability that has accompanied global economic growth and the consolidation of resources and power in a small number of mega corporations, are crying out for a focus on how organizations and stakeholders work together across boundaries in pursuit of sustainable eco-systems. Broader impacts on the distribution of wealth, the health of the natural environment, human rights, security, and the nature of societies and humanity are increasingly part of the sustainable development discussion. These impacts are a concern not only of NGOs but also of a growing and vocal contingent of politicians, academics, corporate leaders, and investors. In OD as well, a focus on the broader eco-system and a broader set of outcomes has appeared (e.g., Cagliano, Caniato, & Worley, 2016; Cooperrider & Dutton, 1999; Cooperrider & Whitney, 2005; Cummings, 1984; Docherty, Forslin, & Shani, 2002; Mohrman & Shani, 2011; Shani & Docherty, 2003). This emphasis has been accelerating due to the recognition that dealing with the externalities resulting from economic activity cannot be achieved one organization at a time, but requires much broader, multi-stakeholder intervention capability.

Helping tackle the challenges being faced in our highly integrated economy and interdependent world will require clarity about purposes, an expansion of our scope of focus and expertize, and the inclusion of a broad set of stakeholders (Freeman, Harrison, Wicks, Parmar, & DeColle, 2010). OD's approaches must increasingly foster development that advances three intertwined outcomes – financial, social, and environmental – that comprise the elements of the triple bottom line (Elkington, 1994; Savitz, 2006). They must also address impacts from the accelerating pace of technology development that is deeply intertwined in the networks of activity that shape outcomes in all three of these domains. Advanced technology has yielded new approaches and capabilities that cry out for eco-system perspectives.

In this chapter, we focus on the need for our intervention frameworks to simultaneously address the technical and social development of eco-systems, and what kinds of approaches and changes will be required. We provide two examples, one from healthcare and one from agri-foods systems, that illustrate this shift to the eco-system level and discuss the implications for the field of OD. We chose healthcare and the food industry because of their clear relationship to sustainable development and the present and future well-being of humanity as manifest in the inclusion of health promotion and hunger eradication in the UN Post-2015 Global Agenda. Both healthcare and the food supply chain are embedded in complex eco-systems which are intricately related to the underlying capacity of societies and economies, and to the health of our natural environment. Given population demographics, achieving equitable population access to healthcare, and food sufficiency are challenges both for countries with advanced economies and for those with emerging economies (Mohrman & Shani, 2014; Worley & Mirvis, 2013). Both of these industries have to a great extent become the purview of large systems and corporations. They are

experiencing the conflicting expectations of a complex set of stakeholders in a context that is taxing the resources required to address the needs of the overall population. Technological advances are fundamentally changing the nature of the products and services and organizing approaches in both these domains. Technology is seen by many as providing major breakthroughs that may fundamentally enhance the ability to meet the needs of the population, and in so doing contribute to sustainable development; yet technology is also seen as carrying risks and having unintended consequences for stakeholders. Currently these two economic sectors are experiencing severe disruption.

We start by discussing the nature of the sustainable development challenges entailed in harnessing advanced technology in general, and in healthcare in particular. We use a case example to illustrate design approaches that address the social and technical issues in moving toward digitally enabled healthcare.

Harnessing New Technology for Sustainable Development

The steady advance of digital technology that has enabled global connection and integration across populations and organizations has catalyzed fundamental change in societal norms, behaviors, and expectations. The public discourse emphasizes the pervasiveness of social media in the lives of populations everywhere, easy access to and expectations of transparency of information, and the impact of the internet on awareness and aspirations of people around the world. Debates are emerging around the benefits and dangers associated with the rapid transition to a digitally enabled future, the amount of power held by a few companies whose platforms are in many ways shaping our future, and the benefits and dangers of incorporation of artificial intelligence into advanced digital systems. In a sense, the whole world is engaged in a period of experimentation that will fundamentally change the nature of human existence. This experimentation is not being guided by a social compact, nor by collective reflection. It is happening so quickly that the basic elements of a technologized world are being defined before there is a chance for stakeholders of this change to influence the direction and nature of these changes. For example, Facebook now has approximately $40 billion of revenue from targeted advertising to its user base comprised of one quarter of the Earth's population. Its self-proclaimed value is to connect the world. Its original credo to "move fast and break things," has been changed to "move fast with stable infrastructure" (Baer, 2014). It has sole control over the algorithms that determine what feeds are highlighted to its users, and indeed, over who its users are. It has recently come under fire because of the role its technology has played in influencing global politics and in enabling the dissemination of "fake news," and because of the impact it is having on personal lives of users (e.g., Shipman, 2017).

Mark Zuckerberg, its CEO, has announced changes to the algorithm aimed at making "time spent on Facebook well spent" and has unilaterally changed its feed priorities to emphasize communication from family and friends (Dominoske, 2018). Decisions about the priorities that are built into the Facebook algorithm that will impact the daily lives of a quarter of the world's population are being made based on the business pressures and personal values of Facebook leadership.

In another example that illustrates the power of algorithms in social service settings, a study of a Family Screening Tool that has been used to identify children at risk has been found to have built in assumptions that poverty equates to risk, and has singled out poor children as likely to be abused or neglected (Eubanks, 2018), making them more likely to be removed from their homes. Bias and calculation errors are likely built into many or even most applications, having real implications for users, clients, and equity in our society. Similar issues of equity and probity are built into the increasingly frequent use of algorithms in the criminal justice system and to determine distribution of finite societal benefits to individuals-based. Often the agencies applying the algorithms have purchased them from software companies and do not themselves fully understand how decisions are made by the artificial intelligence (AI) system (Tashea, 2017).

The rapid development and implementation of digital applications clearly has both positive and unsettling implications at the societal level where there have been changes in the patterns of economic and social behavior that are just beginning to be understood, and also at the organizational level. Organization designs are changing fundamentally to reflect the technical, social, and economic realities of our times. Technology has enabled horizontal and industry models and temporary network models characterized by partnerships and outsourcing, as well as a large increase in the use of contract and transaction-based workers replacing traditional loyalty and commitment-based relationships. The acceleration of these approaches has been made possible by the generation of powerful internet-enabled digital platforms, such as those notably employed by Uber, Didi Chuxing, and other gig-based businesses, by Amazon and Alibaba as they relentlessly pursue complements to their original e-commerce platforms, and by Facebook, Tencent, and Google as they persistently grow their power, wealth, and roles by connecting people, information, advertisers, employers, and customers. Platforms are "combinations of hardware and software that provide standards, interfaces and rules that allow providers of complements to add value and interact with each other and the user" (Teece & Linden, 2017). Platform designs shape and influence behavior in the resulting eco-system. Many traditional industries are changing their business and operating models by building cloud-based platforms, building the eco-systems around them, and even by selling and servicing platforms for their customers. Examples include digital streaming (e.g., Netflix), global secure payments (e.g., PayPal), global service aggregators (e.g., Expedia), the purveyors as well as servicers of

integrated banking systems (Rakuten) and enterprise information systems for businesses (e.g., Oracle). Entire industries are being disrupted by new entrants because of the ease of building new and more agile business models based on digital platforms – platforms for which these companies control and manage algorithms that are rarely transparent to the users.

Technology and society have always co-evolved, and networks of organizations and other entities have interacted with each other to acquire scarce resources (Carroll & Hannan, 2000; Monge & Contractor, 2003). Indeed, the socio-technical system (STS) theory of work design emerged more than 70 years ago in response to fundamental advances in technology that allowed routine and often dangerous and dirty work to be done differently, and that simultaneously called for new social organizations to take advantage of these new technologies while addressing the outcomes for their employees (Pasmore, 1998; Pasmore, Francis, & Shani, 1982; Taylor & Felten, 1993). Yet in today's world, the technical element of the socio-technical balance has changed fundamentally in scope and impact on social organization at all levels, affecting how we live, work together, define ourselves, and get our needs met, or not. There are expansive visions such as dramatically slowing "aging" or colonizing Mars in order to address challenges of the earth's limited resources, escalating pollution, and burgeoning population. There are also visions of AI enabling smart machines to replace and improve even the most advanced knowledge work currently carried out by human beings, and perhaps even to govern organization, societal decisions and strategies.

The implications of advanced technology on work and organizations are just beginning to be systematically investigated, better understood and critically examined (Davenport & Kirby, 2016; Gazzaley & Rosen, 2016; Medeiros-Ward, Watson, & Strayer, 2015), but innovation and incorporation into society and economy are proceeding at an exponential rate, and aggressively shaping the future. Relevant technical and market optimization and integration are already extending well beyond company boundaries to include industry and cross-industry eco-systems. Large elements of the global economy are now linked together by technology platforms that enable and, in fact, require the members of the eco-system to operate in a complementary way.

The contours of the digitized organization future are beginning to be clear. IT platforms, often developed and owned by particular economic entities, are becoming the integrators (and in many ways provide the direction and supervision) of activities that often are carried out by a dynamic configuration of teams cutting across organizational, sector, cultural, and geographic boundaries. We label these teams "smart" because the technology provides unprecedented access to data, information, and analyses that provide the foundation for coordinated and complementary activity and as well for autonomy. Work systems and even organizational entities are increasingly assembled transactionally, contractually, temporarily, and virtually. New business models take advantage of advanced technological breakthroughs to create a platform of

service and product offerings that are continually updated as technology advances. Organizations change rapidly as these technologies advance. Many organizations are populated by a small core of mission critical employees who carry out the strategic innovation tasks, and connect to contractors, outsourcers and partners who carry out complementary and often more routine tasks and roles in the eco-system wide network that is defined through various connections to the IT platform (Teece & Linden, 2017; Weber, 2017). Transparent feedback and ratings from customers, co-workers, and other stakeholders often determine market opportunities for individuals and organizations in this rapidly shifting space. Through crowdsourcing, large group design processes, and social media input mechanisms, product and service innovation and new operating systems can be generated with sweeping involvement across the many stakeholders who will be impacted. Advanced analytics and processing power well beyond the capacity of the human brain offer the possibility to generate complex data-based decisions and solutions to individualize ads, service offerings, treatment protocols, and behavioral incentives.

It is already clear that there are winners and losers as advanced technologies reshape organizations and eco-systems of activity. Yet the linking and participative capabilities inherent in advanced technologies also offer hope that digitized work systems can be designed and implemented in ways that address stakeholder concerns and address equity issues in the distribution of benefit. In this section, we use the example of a healthcare organization, Satellite Healthcare, to show how the pervasive and expansive advances in digitally enabled work systems impact our frameworks for organization and work system design.

IT Platform Enabled Redesign: The Case of Satellite Healthcare

Healthcare is a human need where, even in wealthy nations, demand has surpassed the resources available for care. Although expectations for high-quality care using the latest and often most expensive medical technologies has contributed to the gap, it is also clear that technology, particularly the application of advanced digital technologies, will be integral to establishing sustainable, integrated healthcare delivery approaches (Lettieri et al., 2012). Healthcare cries out for redesign at the eco-system level.

The trend in healthcare is to invest in capabilities that will help sustain the system through a shift from reimbursement for services rendered to reimbursement for value. Value is measured against patient outcomes and the delivery system is resourced and rewarded based on value creation for the patient. Value-based healthcare is sometimes defined by the triple aim to optimize health system performance around three dimensions: reducing per capita cost, improving clinical outcomes, and improving the patient's experience of care (Berwick, Nolan, & Whittington, 2008).

Satellite Healthcare is a kidney dialysis company that operates in six states in the United States. It has embarked on a value-based transformation process that relies heavily on advancing its social and technical capabilities. Dialysis is a process of removing waste and excess water from the blood and is used primarily as an artificial replacement for lost kidney function in people with kidney failure. Historically, patients with chronically worsening kidney malfunction often have had to travel great distances to get regular and frequent treatment at a medical center that is equipped to provide dialysis services.

Dr Norm Coplon, the founder of Satellite Healthcare in 1974, believed it was possible to provide personalized dialysis care in a friendlier, more comfortable environment closer to where patients live. The philosophy is that the whole person is the focus of care and the objective is to improve each patient's overall quality of life. Today, Satellite Healthcare's staff of over 1,500 work to improve the quality of life for more than 6,800 patients, across 80 centers and six states.

The company has more recently been a front runner and market leader in providing the option for home therapy with their WellBound™ program. In addition to the convenience and independence that this offers to patients and their families, home dialysis can be clinically more effective because it can be carried out more flexibly with closer connection to the patient's individual physiological cycles rather than at a pre-scheduled time, contributing to feeling better and to longevity (National Kidney Foundation, 2015).

In the WellBound™ program, specialty-certified nurses train patients to perform their own dialysis treatments at home, and then ensure ongoing support as needed, giving patients and their families the peace of mind that they can get help no matter when. Although there is a significant cost to delivering the upfront training, the ongoing cost of home dialysis is less than regular visits to the clinic, and the Satellite staff are able to deliver care to a greater number of patients.

From a triple aim perspective, home dialysis would seem to be a preferred modality of treatment compared to in-clinic treatment. The challenge to Satellite Healthcare is that only around 20% of its patients opt for and stay in the home program over time. More than 500 trained patients will come off home therapy this year. Nationally, 40%–50% of all home dialysis patients drop out, most in the first months of home care. The most common reasons mentioned by Satellite Healthcare's patients for dropping out are fear of making a mistake, and a desire for more support from nurses and other patients. The company knows it needs to design a more effective homecare model with significant changes in how patients are trained, monitored, and supported if they are to improve patients' engagement, sense of connection to healthcare professionals, and comfort and ease with managing their own healthcare. Solving this problem will have significant benefits to the company, to the lives and health of their patients, and to the ability to provide dialysis services to a larger population at a lower cost.

Satellite Healthcare has engaged in a systematic multi-stakeholder, socio-technical design process, called Reimagined Home, to fundamentally redesign the full life-cycle system of home dialysis. The goals of Reimagined Home are:

- Reduce the dropout rate of dialysis patients on home care while improving the customer experience and reducing costs.
- Increase patient satisfaction.
- Develop and implement a digital application that supports deeper engagement and connection of patients, and better management of their condition.
- Create a new industry standard for dialysis home care that enhances Satellite Healthcare's industry leadership and serves as a source of competitive differentiation and increased market share.
- Receive a positive ROI in 2017 and beyond through:
  - — cost savings driven by a more efficient training model;
  - — reduced patient drop out which drives more revenue and EBITDA; and
  - — increased home program EBITDA growth as a result of the new resources, processes, and tools developed in the Reimagined Home design process.

Socio-technical Digital Design Approach

Reimagined Home followed a socio-technical digital design approach. The focus is to design a solution that more effectively meets the needs of the home dialysis patient, creates a better experience and outcomes, and results in the patients choosing home dialysis as their preferred treatment method. This socio-technical digital design method embraces and addresses the interaction between technology, individuals, organizations, and the larger eco-system, and builds on the concepts of user experience design (Goodwin & Cooper, 2009). This system-based approach includes the hardware, software, social, psychological, economic, and other elements of the overall user experience. The socio-technical task is to create joint optimization of the full system, which we are referring to as the eco-system because it extends well beyond Satellite Healthcare. It includes the social and technical connections among other actors such as technology and pharmaceutical providers, referring physicians and related healthcare organizations, families and other care givers, and other complementary services that have typically not been well-coordinated, nor mutually reinforcing on behalf of meeting patient needs.

A traditional approach to socio-technical design might focus on joint optimization of the company's work systems – its processes, technology, and employees – to accomplish the technical tasks of delivering care and to set up a social system that allows for meaning and development of the workforce. It was clear to the Satellite Healthcare's leaders that designing a system to enable

self-care would entail a significant expansion of focus, purpose, and participation in the design process, and that the primary focus should be the patient experience. In Reimagined Home, the technology, the work system, the patient's immediate context, and the broader eco-system were being jointly redesigned. The hardware and software of the digital device were designed to work interactively with home dialysis and monitoring equipment as well as to be aligned with and connected to physician, nurses, vendors, pharmacist and family members, and with other channels of information and communications. The ultimate goal was to make home dialysis treatment easier, more supporting and informative, and to instill greater confidence in the patients. This expanded socio-technical approach attempts to design an aligned eco-system, understanding that a coherent integrated system of care that creates value for the user and leads to greater self-care extends well beyond the work system of any particular care delivery organization.

Satellite's sponsor team included the CEO, Chief Medical Officer, COO, and Chief Innovation Officer. The consulting team was multi-functional, including digital designers and socio-technical organization designers. The process followed phases that illustrate the increased complexity that has to be addressed in redesigning this value-centered care delivery system: research, design, prototype/test, and scale. These are briefly described below.

Research Phase

The consulting team conducted over 100 ethnographic interviews and observations with eco-systems members. The data were coded and interpreted, and turned into insights about both the social and the technical elements of home-care dialysis. These insights were shared with stakeholders, iterated based on their sense-making, and used to guide the design process. The critical insights pertained to patient needs, motivations, and behavior as they interacted with the full care delivery system and technical processes that underpinned it. Satellite Healthcare providers and patients in the center and home environments were interviewed. Other members of the eco-system were also interviewed, including vendors, family members, social workers, dietitians, pharmacists, and payers. An interview protocol was used which allowed for three primary analyses to be completed; an eco-system map, a touchpoint analysis, and a variance analysis.

Mapping the eco-system. The eco-system map is a systematic network diagram of all the actors and stakeholders who constitute, will be affected by, and need to be involved in the home dialysis process. It shows how they relate to one another. The core actors in the eco-system are the Satellite Healthcare members that make a care promise to a dialysis patient, the professionals who deliver on that promise by providing care through different channels, and the patient, family, and other personal support system members. The map serves as a basis

for generating new organizing concepts for the eco-system that will change how actors work together.

Patient journey touchpoint analysis. A journey map puts the patient at the center of analysis and adds the care cycle time element. It identifies every patient homecare dialysis touchpoint moment and experience during the cycles and phases of care. For each patient touchpoint, the following are identified:

- activities the dialysis patients perform;
- information they use and share;
- people with whom they interact;
- care delivery services or products they need; and
- devices they use and the channels through which they communicate.

Variance analysis. Based on the interviews, variances are identified between what interviewees view as ideal for each touchpoint and what the patients experience in the current homecare system. This variance analysis is an input to the multi-stakeholder design process where a system will be designed to eliminate or control the variances that have the greatest impact on patient experience and outcomes, and on meeting patient expectations.

By depicting all the touchpoints in a home dialysis experience as well as the needs and purposes of all the eco-systems stakeholders, a view of the care delivery system is created that can inform simultaneous design of the organizational as well as inter-organizational system and the technology application that will enable optimal home self-care.

Design Phase

The products from the research phase are inputs to the design phase. Representatives from all members of the eco-system were brought together to co-create a new care delivery model. A large group design lab involved 78 participants from the eco-system including patients, physicians, nurses, center and regional managers, CEO and board chairman, home dialysis equipment vendors, family members, pharmacists, and digital application developers. In the design lab, cross-eco-system stakeholder groups were formed to redesign specific touchpoints. These groups presented their draft solutions to the larger group for feedback and iterative redesign to ensure the integrity of the full system. Concurrently, a group of digital application designers created high-level designs for the home dialysis technology solution that would enable integration of the full system, getting input from the participants and iterating in concert with the design of the social system. The relationships and insights gained through the co-creation process are critical to designing the specifications for an eco-system level solution. The social and technical solutions created in the lab were the inputs for the next stage of work, the prototype phase.

Prototype/Test and Learn Phase

The design solutions created in the design phase were tested in five centers to learn and develop the prototype. Each of those centers did the detail design to embody the solution in the way they work with their homecare patients. In this way, multiple working models of the Reimagine Home system solution were created and implemented, providing the basis for an iterative test and learn process, and for convergence on a model. The technical application has been tested and further developed iteratively in interaction with the design and testing of the full work system. The digital application is a common platform for members of the eco-system to coordinate and get the information necessary to carry out their roles.

As an example of the organization changes that have been made, the test and learn process generated a new role called a "path-finder" that was created to guide the home dialysis patient through the Reimagined Home system through digital as well as person to person interaction. This role is a key socio-technical integration feature that orients and supports the patient who is using the technology-based support tool and communications device. A second change in Satellite Healthcare's work system is the creation of "smart teams" – multi-functional teams that include the path-finder and that are enabled by data to monitor and detect when it is necessary to supplement the self-care with intervention and treatment, and thus to make improvements in the work system over time.

Once dialysis patients and other eco-system stakeholders felt the prototype that was developed by the initial test centers met requirements, and thus it was ready for scale.

Scale Phase

The prototype is being disseminated throughout the full Satellite Healthcare system during the scale phase. For this purpose, it has been decomposed into bundles of functionality or capabilities. The other centers are being brought together to create implementation plans to embed these homecare functionalities into their work systems as they put the Reimagine Home program in place. The centers get together in 30-60-90 day learning and iteration cycles to learn from each other's experience about what is working and what needs to be modified. To ensure that the various disciplines that are involved are changing to fit the new work system, cross-cutting functional groupings of eco-system roles such as center managers, physicians, or path-finders are created so the work system can be fully understood, supported, trained, and practiced. The technology and the social system design are being adjusted and modified as learning occurs during this dissemination process.

Learnings from Satellite Health

The unit of analysis in traditional organizational and socio-technical design has typically been a bounded segment of an organization or the organization as a

whole. The stakeholders whose purposes have been addressed have been the company and its employees as they together designed an organizational system to deliver value to customers. The inclusive design approach described in the Satellite Healthcare case fits a changing world where digital technology has enabled the breaking down of boundaries between the organization, its customers, and other stakeholders and participants in the eco-system, often leading to changes that impact them all. An organization's ability to deliver value to and with its stakeholders now depends on changing their relationship to and participation in processes where digital technology connects their activities and addresses their interests. To design for the efficiency and effectiveness of such systems of activity and value delivery, the traditional unit of analysis for socio-technical design needs to be expanded to represent the entire eco-system. Only in that way it is possible to design based on accurate representations of the functionality of the system and the purposes of its participants, and to meet the requirements and deliver equitable outcomes for all the parts of the system. In Satellite Healthcare, integrative design occurred through a transparent process that focused all stakeholders on the interests and outcomes of the patient.

Learning lies at the heart of this design process, and of creating sustainable work systems in general (Docherty et al., 2002; Shani & Docherty, 2003). The four-stage process used to develop and iterate Satellite Healthcare's work system can be viewed as action research, a participatory process that develops practical knowledge to achieve human purposes (Reason & Bradbury, 2001; Stebbins & Shani, 2002). The process was reflexive requiring the combination of technical knowledge with the consideration and integration of the social perspectives in the system (Moldaschl & Brodner, 2002). Learning occurs through research, stakeholder exchange of perspectives, collective testing and iterating of the system, and developing explicit ongoing learning mechanisms for ongoing improvement.

In designing for work systems that extend across many network elements and are integrated by digital technology, the fundamental intent, approaches, and values of STS design remain relevant, but the simultaneous optimization of the social and technical sub-systems is achieved through co-design and learning by all the actors of the care eco-system. For designers, this has clear implications. The four-stage process described in the Satellite Healthcare example requires the orchestration of a large set of stakeholders as they share perspectives, make design trade-offs and search for integrative solutions, and as they iterate the design through an implementation learning process. As the mutual understanding of the perspectives and needs of the different stakeholders increases, and as they together try out and learn from new behaviors with new technology within a changing eco-system framework, the eco-system gradually takes on new properties that result not only in changes in the behavior but also in the stakes and outcomes of the different participants.

Eco-systems are complex systems, and the orchestration of their redesign entails many simultaneous focuses of change that impact the complex dynamics

between the involved constituencies. To address this complexity, the intervention team itself has to be constituted of several specialties, including those who are designing technology to fit with the work system that is evolving and the purposes of the stakeholders. Organizational designers make sure that the evolving work system is crafted to take advantage of the capacity of technology to contribute to and serve as the connective tissue in an eco-system that delivers value to multiple stakeholders – not just to the company that has initiated the transformation.

Given population demographics, the adoption of healthcare technology that enables home- and self-care is an inevitable component of sustainable healthcare: one that will be welcomed by some and feared and resisted by others. Both providers and patients alike are having to learn new assumptions and practices. Healthcare's many specialty groups have different deep expertise, professional preferences, expectations and roles in a system that has revolved primarily around patients coming to them, rather than care going on at home. Many providers have limited understanding of each other's contributions and roles, of business principles, or of technology development and deployment principles. They often have little understanding of the delivery system as experienced by patients, whose behavior and assumptions also have to change fundamentally in order for the full value of homecare to be experienced. Successfully embedding digital technology in care systems so that the triple aim of sustainable healthcare is achieved will require incorporating the legitimate requirements of the full eco-system.

In the Satellite Healthcare example, customer experience served as the integrative motivating focus. Each organization and actor had its own institutional and personal objectives such as the ROI and market leadership objectives of Satellite Healthcare, vendors, and the technology and design consulting firms that were partners in the design process. All realized that their objectives could not be sustainably achieved if they did not improve the patient experience and outcomes by creating a significantly different eco-system level model of care that addressed patient needs, purposes, and concerns.

In the next section, we will use examples from the agri-food industry to dig deeper into the intervention challenges of working with eco-systems where sustainable development requires the building of common purpose and coordinated action across multiple stakeholders.

Designing Purpose-driven Multi-stakeholder Systems for Sustainable Development

The world we live in today faces intractable problems with a common genesis: finite resources are available to address the increasing aspirations, expectations, demands, and needs of a diverse and burgeoning population characterized by

often conflicting and competing preferences. At the global level as well as in regions, countries, communities, cities, companies, and individual households, sustainability requires us to organize to use resources efficiently, effectively, and equitably. Citing the increasing challenges and gaps and the criticality of sustainable development, the UN Post-2015 Global Development Agenda (2015) has set goals and called for global collaboration to address inequities and risks in eight areas including poverty and hunger, primary education, child mortality, maternal health, disease prevention, and environmental sustainability. In some areas, such as the impacts of climate change, there appears to be a global consensus that action is required. Catalyzed by the alarming acceleration of global warming and its potentially catastrophic costs and risks, 195 countries signed the 2015 Paris Accord agreeing to measures aimed at keeping the global average temperature increase to less than 2°C above pre-industrial levels. Although the measures to achieve the goals of this far-reaching agenda are not fully in place and it is not certain that major players will adhere to their commitments, the global concern about sustainable development is strong and many initiatives are underway.

Research investigating organizational approaches to become more sustainable stresses the importance of partnerships and multi-stakeholder involvement, and the need to address full eco-systems, value streams, and communities of activity rather than focusing solely on siloed and organization-by-organization initiatives (Lifvergren, Huzzard, & Docherty, 2009; Mirvis & Worley, 2013). The latter approach may decrease unsustainability of particular actors but has done little to change overall unsustainable patterns (Hoffman & Ehrenfeld, 2015). Even multi-stakeholder involvement, although necessary, may not be sufficient to build a more sustainable world. In a global economy where the dominant purpose of most companies is generating wealth for owners and executives, power disparities mean that involvement and co-design, and the articulation of the value to be delivered to stakeholders (Freeman et al., 2010) do not assure that the purposes of sustainable development will be fostered through collaboration.

Because of these difficulties, many sustainability scholars and advocates have come to believe that achieving a sustainable future requires a fundamental shift of values and purpose away from shareholder wealth maximization as the primary role of companies, and from consumerism and competition as the guiding principles to achieve meaning (Brown & Khurana, 2015; Hoffman, 2016; Laszlo, 2015). Underscoring the moral and ethical issues that are inherent in such a transition, Pope Francis's *Encyclical Letter Laudato Si'* (Pope Francis, 2015) calls for an elevation of the purposes of human development, equity and sustainability, and provides guidance about the prevailing economic and social currents that work against these purposes. His thesis is that today's emphases on rapid development, consumerism and immediate gratification, and the elevation of wealth creation above all other purposes contributes to the increased unsustainability of the earth and the suffering of people. His

treatment, framed in Catholic theological writings but drawing on other religious traditions, draws extensively on science, philosophy, and many other perspectives about our responsibility to address the ills we have wrought.

Although concern with sustainability is strongly rooted in values-based analysis (e.g., Carlson, 1962; Schumacher, 1973), much of the recent corporate focus has drawn on motivation squarely within the prevailing capitalistic framework of competition, growth, and shareholder wealth. Sustainability is to be enabled by marketing and product strategies that align the company with the pragmatic need to have a social license to operate. Corporate citizenship, reputation, and branding are viewed as business opportunities and differentiators and risk reduction imperatives (Laszlo & Zhexembayeva, 2011; Porter & Kramer, 2006). Nevertheless, as companies become experienced in working toward sustainable effectiveness, there is evidence that some start to incorporate values of social and ecological responsibility and stakeholder value not only into their strategies but also into the core purposes and values that shape the way they operate (Amadeo, 2009; Worley & Mohrman, 2015). There is increased recognition that a company's sustainability is inextricably linked to the health of the eco-systems in which it operates. Sustainability has been among the founding principles of some companies, such as Patagonia, Whole Foods, and Ben and Jerry's. Concerned corporate leaders such as Paul Polman of Unilever, Marc Benioff of Salesforce.com, and now-deceased Ray Anderson of Interface Carpets have made values-based arguments that expand the core purposes of the company beyond the creation of shareholder wealth to include social and environmental outcomes and a commitment to a sustainable future (Anderson, 2011; Benioff & Southwick, 2004; Lucas, 2012; Unilever, 2013).

Concern with sustainable development intertwines with the discussion about the impacts of advanced technology. There is mounting critical discourse about the consequences of the unprecedented rate of advance of digitally based technologies for the nature of society and humanity and for sustainable development. These technologies are already helping to address intractable problems such as by providing new ways to diagnose and treat illness, new approaches to monitor and reduce consumption of scarce resources such as water and energy, and new technical solutions that are cleaner, safer, and less damaging to our health and the environment. Human capability is being augmented (Davenport & Kirby, 2016; Porter & Heppelmann, 2017), and knowledge, tools, and connectivity are empowering individuals. We are also beginning to experience and learn about other, more troublesome, impacts of the digital advances, including on the human brain and psyche, on the power of technology companies to shape society and concentrate wealth, and on privacy and security, and about the associated lack of transparency about whose values and interests are being served (Brody, 2016; Cowen, 2016; Sullivan, 2016).

It is clear that how technology unfolds is integral not only to the nature of the society that is unfolding, but also to the capacity for sustainable development. Increasing voices argue for making considered choices about the

directionality and nature of technology driven change and for engaging stakeholders in designing solutions that consider and address human purpose and sustainability. Many of these voices come from leaders in the technology industry, including from Elon Musk, founder of Tesla and many other high technology ventures (Dowd, 2017), who is concerned about the capacity of Artificial Intelligence (AI) to fundamentally change the nature of humanity. Marc Benioff, founder of Salesforce.com, advocates greater regulation of social media companies that are in his view using approaches that are purposely leading to the addiction of the public to their products (The Guardian, 2018). In a recognition of the importance of societal learning and dialog and debate about AI and its applications, six companies including Amazon, Google, Deep Mind, Facebook, IBM, and Microsoft have established AI Partnership,

> to study and formulate best practices on AI technologies, to advance the public's understanding of AI, and to serve as an open platform for discussion and engagement about AI and its influences on people and society. (www.partnershiponai.org)

Even the nature of sustainability is contestable, as the definition is subject to opinion about and preferences for the societies, work systems, and world in which we exist (Docherty, Kira, & Shani, 2009). Finding common purpose to guide the transition to increased sustainability will depend bringing more voices to the table to reflect on purpose and to question assumptions and establish principles to guide how we proceed during this period of fundamental transition. Currently, what is technologically possible and what leads to the greatest wealth generation are the two factors that have guided how the digital economy is unfolding. Our thesis is that systematic, multi-stakeholder, and socio-technical approaches to generating and embodying technological capabilities in the design of social and technical systems are required to incorporate the broader purposes required for sustainable development. We next describe some examples from the agri-food industry that provide insight into the incorporation of purpose into complex eco-system design processes.

Sustainable Development of the Agri-foods Supply Chain

The agri-foods industry is core to the discussion of sustainable development because of its direct relationship to life, health, and cultural identity, and because of its impact and dependence on the limited natural resources of our planet. It is a significant part of the economy and employment base of many countries, regions, and communities. The food industry has become highly globalized, competitive, industrialized, technologized and commoditized. Many suppliers, especially small farmers around the world, are price takers with little bargaining power, and are barely scraping by financially. The industry's search for lower costs, greater yield, and wider markets has helped reduce hunger, but has also taken a heavy toll through its externalities. These include impacts on the environment and human health through use of pesticides, growing practices that harm the earth, greenhouse gas pollution resulting from the transport of

food around the world, and food processing that contributes to obesity and disease by relying heavily on sugar, salt, and fat (Gerbens-Leenes, Moll, & Uiterkamp, 2003; Godfray et al., 2010). In developed countries, food systems currently contribute between 15% and 28% of overall greenhouse gas emissions. Providing sufficient food for the earth's projected 9 billion population in 2050 is expected to constitute 45% of global energy and 30% of global water demand for agricultural activities alone (Foresight, 2011).

Currently, the global food chain is not meeting the needs of the earth's population. Over 900 million people suffer from hunger, and while undernourishment has decreased globally, at the same time diet related obesity affects up to a quarter of the world's population (Aiking & de Boer, 2004). Even in wealthy western countries, there are "food deserts," generally in impoverished areas where there is little or no access to fresh fruit, vegetables, and other healthful whole foods (americannutritionassociation.org/newsletter/usda-defines-food-deserts). At the same time, it is estimated that one-third of all food produced in the world is wasted (FAO, 2017).

Current consumer concerns and demands for food that is healthy, tasty, and sustainably produced are disrupting the industry, and may provide opportunities to move out of the cycle of commoditization of food through differentiation of products. This disruption may provide an opening to build sustainable food chains by stimulating innovations in the food value stream, where the production, processing, distribution, and consumption of food often occur through complex, fragmented and often global supply chains (Cagliano et al., 2016). Many stakeholders, including NGOs, governments, and research institutes regulate, control, and influence agri-foods activities. Sustainable development requires working with these and other stakeholders to design eco-systems aligned around the purposes of meeting the fundamental human need for healthy food and the preservation of the natural resources required to sustain this flow.

The criticality of a sustainable agri-food sector was highlighted in 2015 when Milan, Italy, hosted an international food expo: "Feeding the Planet, Energy for Life." In conjunction with this expo, Politechnico di Milano hosted a conference, "Organizing Supply Chain Processes for Sustainable Innovation in the Agri-food Industry." Academics from 18 universities and organizational practitioners from 14 organizational settings in five countries shared case descriptions of supply chain innovations. Ten cases were further developed as chapters in Volume 5 (Cagliano et al., 2016) of the Emerald Series on *Organizing for Sustainable Effectiveness* (Mohrman, Shani, & Worley, editors). Below, we draw heavily on these cases to describe the kinds of intervention and design approaches and skills that are needed to realign multi-stakeholder ecosystems to achieve triple bottom line outcomes.

The food supply chain consists of growing, processing, distribution, and consumption. Some of the innovations described at the conference were centered in specific parts of the value stream but they all involve multiple elements (see Table 1). For example, ALCASS's focus on introducing an organics frozen

Table 1. Redesigning the Agri-food Supply Chain: Eco-system Level Interventions.

Chapter Name	Focus of the Chapter	Purposes of Intervention	Participating Stakeholders	Convening Organizations
ALCASS: Innovation for Sustainable Supply Chains for Traditional and New Products *Verónica León-Bravo, Federico Caniato, Antonella Moretto, and Raffaella Cagliano*	• New product development • Innovation for sustainability at ALCASS, a frozen meat and vegetable producers	• Differentiated and healthy products aligned with consumer's changing requirements and habits • Incremental and radical new product development	• ALCASS SpA • Retailers, suppliers • For radical innovation: New supply chain links for organic and soy-based raw materials • Specialized retailers • Partnership with a multinational company for the R&D of new products	ALCASS SpA
Supporting Sustainability through Developing a Learning Network Among Traditional Food Producers: Applications of Action Learning *Paul Coughlan, David Coghlan, Denise O'Leary, Clare Rigg, and Doireann Barrett*	• Development of a learning network among traditional food producers in Europe to produce ventures and innovations	• Economic sustainability of the ventures • Social sustainability of the food's regional character • Environmental sustainability through use of traditional methods of growing	• EU-funded research initiative TRADEIT • Nine regional networks of food producers across eight countries • Countries • Project staff for convening the network and facilitating learning	TRADEIT project staff
Building Social Capital into the Disrupted Green Coffee Supply Chain: Illy's Journey to Quality and Sustainability *Annachiara Longoni and Davide Luzzini*	• Building social capital into the supply chain to support development of a more sustainable supplier network • Bridge the knowledge gap between local food commodity production and the internationally liberalized food trade	• Ecologically sound land management • Vibrant and resilient local farm economies • Social equity – creating shared value for stakeholders • Partnership in exchanging knowledge to improve quality	• Illy • Local grower networks • Det Norske Veritas – a business assurance firm	Illy

The Evolution of Barilla's Durum Wheat Supply Chain Contracts for Triple Bottom Line Benefits *Marco Formentini, ManMohan Sodhi, and Christopher Tang*	• Use of contracts to guarantee a portion of farmers' anticipated income, and to incentivize improvements in growing practices to ensure sustainable practices and more secure production levels	• Profitability • Supply security – decommoditization of durum wheat • Environmental sustainability • Farmers' income • Localizing the supply chain in Barilla production regions • Partnership with stakeholders	• Barilla, a pasta company • Barilla Center for Food and Nutrition Foundation • Farmers' co-ops and consortia	Barilla
Minimizing Food Waste at Google: Creating Production Innovation and Purchasing Practices *Madeleine Pullman and Kristen Rainey*	• Google's program to reduce environmental impact of their food waste through new product development, reuse of wasted food, and waste measurement and feedback	• Quality • Building community • Being responsible	• Google Food Lab • Google Food Program: Integrated food and beverage focus • Compass Group, a sustainability oriented foodservice company and 40 other strategic food vendors • Supplier new product development co-creation • Employees	Google
Surplus Food Redistribution for Social Purposes: The Case of Coop Lombardia *Sedef Sert, Paola Garrone, Marco Melacini, and Alessandro Perego*	• Buon Fine initiative to recover surplus food for human consumption, increase the percentage that gets to intended beneficiaries, and enable successful redistribution of fresh food	• Solidarity and consumer and community welfare • Cooperation to address values of centrality of the person, and their needs and rights • Environmental benefits: reduce negative impacts of large-scale retail trade	• The Coop Lombardia district of Coop Italia, a system of Italian consumer cooperatives, including Buon Fine 52 grocery stores • Grocery stores • Municipality of Sesto San Giovanni • UN Agenda 21 project funds • Food aid organizations	Coop Lombardia

Table 1. (*Continued*)

Chapter Name	Focus of the Chapter	Purposes of Intervention	Participating Stakeholders	Convening Organizations
Packaging's Role in Sustainability: Reusable Plastic Containers in the Agricultural-food Supply Chains *Jay Singh, Abraham (Rami) Shani, Hillary Femal, and Ahmed Deif*	• Economic and social sustainability benefits from the adoption of reusable packaging containers for transporting fresh produce from farm to retail outlets	• Economic benefits • Social benefits: food access due to reduced damage and waste	Implementation of reusable packaging containers requires introduction and coordination of change, and development of monitoring and inventory asset management across full supply chain, including grower-shippers, aggregators, distribution, and retailers.	No intervention described – study only looked at outcomes
Origin Green: When Your Brand Is Your Supply Chain *Mary Shelman, Damien McLoughlin, and Mark Pagell*	• Building sustainability capabilities and branding of Ireland's entire agricultural supply chain as sustainable to increase demand for Irish food products • Developing a national-level, third party-verified sustainability program for agriculture and food	• Economic development • Sustainable agriculture capability development	• Bord Bia, Irish state agency • Vast majority of agri-food companies in Ireland • Teagasc – National Agriculture Research and Farm Advisory Board • Carbon Trust – UK-based NGO helping companies reduce carbon footprint • UCD Michael Smurfit Graduate Business School • Global companies providing action learning opportunities for Origin Green students	Bord Bia, Irish state agency supporting growth of food and drink companies
The Emergence of a Local Foods Network in Northeast Ohio *Susan Albers Mohrman, Sally Breyley Parker, Lorelei Oriel Palacpac, and Cameron Wilk*	• Emergence and development of a local food supply chain	• Social equity, traditional values • Community development, environmental sustainability • Economic development	• Farmers • Aggregators/enablers • Value adding processors • Distribution channels • Social entrepreneurs • Universities • Not-for profit partners • Social service agencies	• Aggregators • Community development corporations • Social entrepreneurs • Consultants • Universities • Social service agencies

			• Local and Federal Government agencies • Community development corporations • Consultants/community developers	
Inclusive Innovation and the Role of Partnerships: The Case of Semi di Libertà *Francesca Mapelli, Marika Arena, and Paolo Strano*	• Building of a viable social enterprise educates and employs prisoners to produces and sells artisan beers	• Foster socially inclusive innovation • Helping prisoners achieve their freedom • Social entrepreneurship • Environmental and social sustainability	• Semi di Libertà, a non-profit association • Prison authorities in Rome for brewery workforce and for raw materials • Ministers of Justice and Education in Italy • A high school in Rome • Agricultural technical college • Mastri Birrai, association of master beer experts • Producers/suppliers of organic, fair-trade crops • Another prison that is employing prisoners to grow crops	Semi di Libertà, a non-profit association dedicated to helping prisoners achieve freedom and reducing recidivism

Cagliano et al. (2016).

food product line reached from research institutes and product development labs, through the establishment of sourcing relationships with new farms and vendors, into labs developing new procedures for the processing plants, new distribution system capabilities, changes by retailers, and new connections to the consumer, who had to learn about and trust organic food, become accustomed to new tastes, and learn safe ways to use organic products (León-Bravo, Caniato, Moretto, & Cagliano, 2016). The other innovations similarly required redesign and integration along the supply chain. They required setting up new connections between the actors in their supply chain eco-systems, working thus to create a shared purpose to deliver social, environmental and economic benefit creating opportunities for actors to learn, grow, and continue to innovate to foster sustainable development.

Different sectors initiated the innovations including companies, NGOs, governmental agencies, social entrepreneurs, and academics. The scope of new supply chain designs ranged from entire countries to the more local eco-systems such as Google's food service, vendors and customers, and food research labs.

Company-initiated innovation initiatives aimed primarily at strengthening the sustainability of the company's supply chain and its ability to address the changing values and expectations of customers as well as other stakeholders for safe, healthy, and tasty food:

- ALCASS built out its supply chain to develop and support its new product line of organic and healthy foods by expanding its eco-system connections to develop relationships and closer process connections to new farms, suppliers, research labs distributors, retailers, and consumers.
- Barilla empowered and supported the quality of life and sustainability of the farmers in its grower cooperatives by introducing new contracting approaches, including quality incentives and the option for price guarantees to reduce income uncertainty, and by providing farmers with R&D support for innovative and sustainable farming practices to increase the quality of the wheat they grow. Barilla's strategy was to build viable supply chain eco-systems that provide high quality durum wheat to its local processing facilities to reduce the need to transport grain long distances, thereby reducing pollution, reducing the degradation of the quality of wheat, and building strong local farmer communities and supply chains.
- Illy, faced with a disruption in the green coffee supply chain, focused on upgrading the growing and business capabilities of local growers to create more stability in its supply chain. It viewed itself as building social and human capital through connections among the growers for learning and by supporting their adoption of best practices.
- Google had a multifaceted strategy to reduce waste and environmental impact along its food supply chain including by building partnerships with suppliers to provide sustainably produced food and by co-creating new products to reuse wasted food. It enlisted employees' and vendors' involvement

in the purposes and nature of the integrated foods program, and developed a measurement, feedback, and incentive system for employees, kitchen workers, and suppliers to regularly review and upgrade their approaches to reducing food waste.

Other innovative approaches were initiated from NGOs and governments, primarily addressing values such as societal well-being, economic development, and inclusion:

- Semi di Liberta, an Italian non-profit association fostering social inclusion, formed a multi-sector eco-system that orchestrated partnerships along a newly formed supply chain from farm-to-consumer. The goal was to transition prisoners from jail to employment in the food industry. The supply chain eco-system centered on an artisan beer company run by prisoners and ex-prisoners.
- TRADEIT, a multi-university and multi-stakeholder research consortium, created networks for learning, exchange, and support among small farmers, and foods entrepreneurs in five regions of the EU. The purpose was to enable learning and the development of successful local foods enterprises based on sustainable practice and products.

Three projects established geographically defined supply chain eco-systems and each had its genesis in a different sector:

1. Coop Lombardia is a non-profit organization promoting cooperative economic participation to address the needs of at-risk members of society. It worked with the municipality of Sesto San Giovanni to design and implement a system connecting food cooperatives and grocery stores to recover surplus foods including fresh produce and meats, and to get them rapidly to food aid organizations for immediate distribution to people in need.
2. Bord Bia, an Irish state agency, built an extensive eco-system to develop and certify sustainable agriculture and food capabilities throughout the country, and thus to brand the entire food chain of Ireland as sustainable (Origin Green). The purpose is to bolster the strength of the sector and the export marketability of its food, to help revive the national economy and contribute to the prosperity of its struggling farming population.
3. A local foods economy has emerged in Northeast Ohio. Many mutually supportive entrepreneurial local food initiatives involving participants from multiple sectors and from multiple phases of the foods value stream have coordinated loosely to stimulate learning and skills development, access and leverage resources, establish synergistic connections, and also to develop eco-system wide local food capabilities.

A 10th case presented a study by a team at Cal Poly San Luis Obispo (US) of the introduction of reusable packaging in the food industry. The industry has largely relied on disposable packaging for ease of field-to-fork transport of

food along the supply chain. The research team demonstrated the economic, environmental, and human health value of reusable packing. Its findings also pointed to the importance of the design of the full value chain. A major adoption challenge is the need to align supply chain actors to introduce coordinated change and redesign of processes including by collectively addressing issues of ownership and distribution of costs of packaging that would in effect become collective assets.

A core challenge in these supply chain innovations is to help align the purposes and behaviors of diverse stakeholders to create a system that yields the expanded system level outcomes required for sustainable development. Again we observe that this work builds on the core values and methodologies of the fields of OD and socio-technical design, which are based on an open systems view of organization and on the building of sustainable work systems (Docherty et al., 2009). The shared purpose to consider the triple bottom line outcomes of the system is the glue that makes it possible to work through the many differing roles, capabilities, and interests of the actors in the eco-system.

From these cases, we have extracted five recurring focuses of intervention and consultation needed to support purpose driven, eco-system level transformation: (1) building trans-organizational, network capabilities, (2) designing sustainable life-cycle value delivery systems, (3) stakeholder involvement, (4) purpose creation, and (5) learning and the design of learning systems. Fig. 1 shows a graphic depiction of these capabilities, depicting purpose as the core glue that keeps the design activities aligned, and multi-stakeholder design as enabling the eco-system wide scope. Trans-organizational systems, value streams, the social and technical aspects of the eco-system are the focuses of the design processes, and learning describes the system dynamics that enable

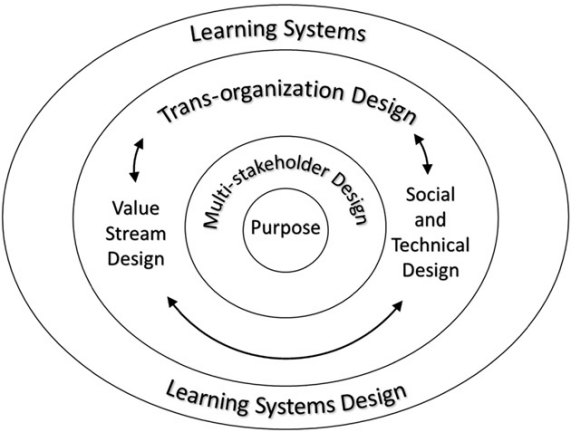

Fig. 1. Consulting to the Eco-system.

dynamic design. The next five sections describe these elements of eco-system level consultation. Because we have already dealt extensively with social and technical design issues, these will be integrated into the discussion of the other five elements of the figure.

Building trans-organizational, network capabilities. Partnerships, alliances, and multi-organizational networks coordinating and collaborating to solve problems or achieve outcomes are not new phenomena. Inter-organizational relationships have been the focus of hundreds of academic studies, and the development of collaboration capabilities for individuals, teams, and organizations has been an important focus for organizational development and design practitioners. Yet building the capacity for collaborative action remains a subject of great concern in organizations throughout the world. Building collaboration across full eco-systems – trans-organizational networks of interdependent activity – was integral to achieving sustainability goals in all of the agri-food cases, just as it is in the healthcare industry, and is in many other industries.

Research on complex systems finds that synergistic connections between eco-system elements are much more likely when the system is stressed because resources are in short supply (Holland, 1995; Ruef, 2000). Multi-organizational approaches have been described in the context of the emerging phenomena of sustainability, social entrepreneurship (Bornstein & Davis, 2010; Waddock, 2008), and corporate responsibility (Mirvis & Worley, 2013). Collaboration to achieve sustainable functioning adds to the already churning cross-cutting dynamics involved in multi-organizational arrangements and the need to define the foundation for collaboration beyond traditional business outcomes.

Theories of trans-organizational development (TD) (Boje & Hillon, 2008; Cummings, 1984) and collaboration (Gray, 1985, 1989; Huxham, 1996) provide guidance for building the capacity for multiple organizations to voluntarily join together to address common problems, work interdependently, and share and leverage resources. The TD framework posits four stages in the formation of a trans-organizational system: (1) defining the domain of focus of the relationship and identifying the actors who need to be included, (2) convening the actors to assess whether the network of actors can commit to a system-wide purpose, (3) formally organizing the system to carry out its interdependent tasks; and evaluating whether the system is achieving its purposes and meeting the needs of its members, and (4) taking steps to improve its performance (Worley & Parker, 2011).

This cycle of development of a trans-org system was evident in the agri-foods cases. All four of these stages were present in the Origin Green example. Bord Bia worked with a broad set of stakeholders to define what became a national strategy to transition the entire food industry in Ireland to gain global recognition for food products that have been certified as sustainably grown. Through many different forums for input and co-design of the approaches that would be used, stakeholders started to commit to this purpose, and see how

they would benefit from this full value stream transition. Farmers and other stakeholders throughout the country agreed to participate in different mechanisms set up to learn how to operate differently, to make changes designed to achieve and maintain certification, and thus agreed to ongoing assessment and improvement processes to continually improve the full supply and distribution chain. Conveners included governmental agencies, NGOs, and university-based organizational development specialists.

The emergence of the local foods network in Northeast Ohio is another example. The local foods economy has grown significantly in scope and size through loosely coordinated activities of many actors and stakeholders. Over more than a decade, different actors, including NGOs, community developers, business leaders, universities, government leaders, and even the National Park System have acted as conveners to: (1) identify and build forums to bring together the various parties along the farm-to-fork supply chain to assess and identify common needs, (2) organize action groups to design solutions, and (3) to strengthen the collaborative capabilities in the network to self-organize to continually evolve the capabilities of the local foods system (Mohrman, Parker, Palacpac, & Wilk, 2016).

Cross-organizational development approaches in the context of sustainability have been examined by Mirvis and Worley (2013), who also took a multiple case analysis approach. They observed that participants engaging in trans-organizational systems generally focus primarily on their own outcomes and often have difficulty committing fully to system level outcomes. This tension was evident in the Ohio local foods case example. Many of the participants were struggling to become financially viable. They formed synergistic relationships primarily to get access to resources such as knowledge, services, and connections. Shared values, purpose, and commitment to the local foods movement provided a glue for this diverse community of participants that allowed them to convene and work through their differences and to identify mutually important areas of focus and action initiatives.

Organizations become more likely to focus on system-level, purpose-driven collaborations as sustainability purposes become increasingly embedded in their own internal functioning (Googins, Mirvis, & Rochlin, 2007; Worley & Mohrman, 2015). Companies such as Illy and Barilla, for example, have developed an internal commitment and capacity to operate sustainably and have come to understand that their own sustainability depends on convening members of the eco-system and contributing to its overall sustainable effectiveness. These companies' experience working across functions to embed triple bottom line purposes in the way they operate internally provides the basis of understanding to align with the members of the supply chain toward system-wide purpose while acknowledging each other's legitimate stakes.

There is a role for organization developers and designers to guide organizations through their internal journey as well as to help design and develop the

eco-system connections to enable system-level synergy and coordination. For many OD practitioners, this will require an expansion of scope and capabilities.

Designing sustainable life-cycle value delivery systems. Organization and multi-organization value streams are complex work systems, and as we saw in the Satellite Healthcare example, they can be designed for the integration of technical and social functioning in order to contribute to the sustainability of the larger system. Socio-technical and strategic organization design methodologies may incorporate technology development including digital application development, process improvement, reengineering, and other work process design approaches. Although OD practitioners have difficulty warming up to these more technically and analytically based methodologies, the combination of social and technical focuses is deep in the roots of the field. Given the increasing digitization of work systems and the hope that technical solutions will help address many of the challenges of sustainability, proficiency in integrating these approaches will be necessary in order to consult to the development of sustainable systems.

Organization design, for example, starts with the premise of ensuring that all the elements of the organization system, including its technical work, management, and people processes should be configured to support the strategy as well as to build the capabilities in the organization to deliver the intended value to customers (Galbraith, 2002, 2005). Designing for customer value is a necessary early step toward a multi-stakeholder view of business. This perspective clarifies that the customer is not just the passive recipient of products and services, but rather that the customer's purposes should be subsumed in the value proposition and the design of products and services, and be the focus of all the processes of the organization. A focus on sustainability requires the expansion of this perspective to include outcomes for other stakeholders who are interdependent with the organization and whose sustainability can be enhanced by a collective focus on triple bottom line outcomes of the full supply chain.

The design of the life cycle and closed loop supply chain processes appear throughout the agri-foods cases. For example, Semi di Liberta designed and implemented a full field-to-consumer value stream for an artisan beer business established to provide a pathway for convicts to reenter society. Coop Lombardia's system for distribution of surplus food can be thought of as putting in place a critical element of a closed loop sustainable supply chain for retailers by providing a pathway for food that would otherwise enter landfills. Google's waste reduction program extended upstream to the development of new products made from food waste. It involved changes in the full stream including its food service vendors, processing, and distribution practices in its kitchens and cafeterias, and a focus on changing employee/consumer eating behavior. As mentioned above, Origin Green systematically built the full sustainable agri-food supply chain capabilities in Ireland all the way to the

consumer. It would have been insufficient to focus only on the sustainable growing capabilities of the farmers, who were already struggling to survive, if there were not mechanisms in place for certifications, aggregation, and development of markets. It may be possible to describe Origin Green as many mutually supportive projects being carried out simultaneously, all aggregated to yield greater sustainability of the agricultural sector in Ireland. Framing the transition that way would greatly underestimate the interdependence in the ecosystem, and the need to achieve synergy by raising the level of intervention to the industry level through system-wide articulation of shared purpose, diagnosis, design, measurement, and assessment.

Eco-systems around the world, large and small, will have to be purposefully designed for sustainable development, drawing in the many stakeholders and participants whose purposes will have to be aligned. Consulting for sustainable development will require the capacity to interweave and orchestrate the social process issues as well as the organizational and technical underpinnings of complete value streams, and multi-functional, multi-organizational, and, often, multi-sectorial collaboration. The definition of OD will have to be extended to include the convening and application of many fields of expertise to design sustainable systems. Traditional OD practice will be practiced in the context of multi-pronged interventions aligning many broad expertises in service of this purpose.

Stakeholder involvement. Bringing multiple stakeholders together to reflect, learn, establish a common foundation of understanding and commitment, solve problems, and design new systems has been the staple of the field of OD. From the early roots of open systems thinking, change approaches, including search conferences (Emery & Trist, 1965; Weisbord & Janoff, 2000) and labor management collaboration to improve work systems (Cooke, 1989; Deery & Iverson, 2005) have employed the principle of multi-stakeholder exploration. Co-creation has been elaborated into various techniques and applications. Today we employ various forms of dialog-based change and exploration that include techniques for the creation of safe places for exchange, non-hierarchical interaction, and the development of collective aspiration. Examples are large group interventions (Bunker & Alban, 1996; Ludema & Mohr, 2003), appreciative inquiry (Cooperrider & Whitney, 2005), and open space techniques (Owen, 2008). The underlying principle is that if stakeholders are brought together and provided a safe place to share their perspectives and dreams, they will together craft a path forward that attends to issues such as equity, diversity, human meaning and sustainability.

Although multiple stakeholders were involved in all of the agri-foods cases, multi-stakeholder decision forums were explicitly described only in a few. The Ohio local foods economy was given a great boost by a Cleveland city-wide Appreciative Inquiry "summit" of over 600 people that included stakeholders

from throughout northeast Ohio. Led by David Cooperrider, the purpose of the summit was to envision and begin to plan how Cleveland could become a "green city on a blue lake" (Meyer-Emerick, 2012). Participants had the opportunity to join focused multi-stakeholder action groups to generate direction and initiate change. A local foods interest group was among them. As the local foods movement gained momentum, smaller multi-stakeholder forums were convened frequently to identify and set up projects to work specific issues such as changing laws that governed the regulation of land use and food distribution in the city to accommodate small and urban farmers. Bord Bia also employed large forums in getting multi-stakeholder (government agencies, farmers, NGOs, food processing companies, and research institutes) input and agreement to overall purpose and approach, and assessment and improvement of the approaches that were being utilized. Coop Lombardia, in keeping with its cooperative roots and mission, convened retailers, social service agencies, and government regulators to agree to the approaches used to solve the challenge of quickly distributing fresh food to people in need. Up to that point, fresh food was rarely included in the food banks because no one had solved the system issues of how to get such food distributed quickly enough to prevent spoilage. Illy established collective learning forums for farmers in particular regions to adopt more effective practices, develop synergistic ties, and increase the quality and marketability of their crops.

Despite the large amount of excellent work by development professionals around the world, it is safe to say that the prevailing hierarchy of power and traditional economic decision-making criteria have determined how the global economy has unfolded and whose stakes have been addressed. Recently, however, NGOs and the public at large are learning to use the same digital communication technologies that enabled the growth of the global economy to appeal to the public, organize action around the globe and locally, and to make information transparent. Their activities are challenging prevailing assumptions and patterns of distribution, and are contributing to the increasingly salient political discourse about whose stakes are being addressed and toward what purposes. They are becoming the conscience and watchdogs for sustainable development, in many cases partnering with companies and other stakeholders in designing significant change (Mirvis & Worley, 2013). Clearly organizational development professionals need, and many already have, the skills to plan and facilitate multi-stakeholder interventions. Increasingly, they also need skills and a sensibility for political action geared to raise eco-system level issues of sustainable functioning to the attention of our organizations and other institutions, and to orchestrate multi-stakeholder approaches that can create new power dynamics and co-create and gain commitment to sustainable paths forward. Organization development toward sustainable functioning has a significant element of political activism and community development.

There are already notable examples where companies, NGOs, farmers cooperatives, and governments have joined together to begin to address such issues

as Fair Trade in the coffee industry (Fridell, 2007; Jaffee, 2007), palm tree deforestation (Nersesian, 2016), and to secure industry collaboration around issues such as workers' rights. Companies such as Unilever, Gap, and Starbucks have worked with NGOs and governments around the world to promote sustainable development, even building such multi-stakeholder collaboration into their company purpose (Unilever, 2013). To support such activity, organization developers and designers will have to help orchestrate and enable the building of organizational capabilities to co-create with other stakeholders, and to help design the organizing framework for these partnerships and initiatives. Rather than thinking in terms of discrete projects and interventions centered in particular organizations, the OD will be to build the repeatable routines of collaborative action that underpin a new company and eco-system capability.

Building shared purposes. Achieving sustainable development will require a transition from deeply entrenched and unsustainable behaviors, practices, structures, and work systems. Unsustainability has been built into practice over time; the various elements of the system reinforce one another and work together to preclude fundamental change. This path dependence makes it very hard to change the fundamental dynamics of social systems. Yet the evident challenges that the status quo presents, and the new capabilities offered by technologies that can augment human capabilities offer an inflection point, in which it may be possible to reorient the global economy toward greater sustainability. This will require a change of purposes of individuals, families, communities, organizations, and whole eco-systems of value producing activity. Transition to sustainable approaches will require changes in the interactions among organizations and other actors in service of increasingly sustainable eco-systems. The most significant challenge is to align purposes of diverse elements of eco-systems in pursuit of this outcome.

The alignment of purpose will not emerge from a scientifically prescribed set of approaches, but will be achieved through reflexive co-design that entails human beings regularly exploring their purposes, and collectively building purpose-driven eco-systems (Brodner, 2009). Rational, data-based analysis shows that current interaction patterns have humanity on a collision course with the resources available to sustain life on the planet. Increasing concern and frustration is expressed by large segments of the world population including by many of those who lead organizations and have benefitted from their wealth-creating capacity. In a study commissioned by the UN to assess the progress of its Global Compact Framework (UN, 2013), Accenture found that only 32% of the top executives of the 1,000 largest global companies believed that we were on a sustainable path to meet the needs of the growing population. Only 33% believed that business was making sufficient efforts to address sustainability challenges. These executives attributed this discrepancy between

their beliefs and actions to being hemmed in by the expectations of shareholders and the competitive requirements of the current economic system. They believed that the path forward requires governmental action, and increased learning and collective action across organizations (United Nations Global Compact – Accenture CEO Study on Sustainability, 2013). The clear message is that sustainable development is not currently an important operational purpose in the majority of large corporations today, despite no shortage of understanding of its importance and of the science behind it. To underscore the importance of purpose, these same CEOs in 2016 (United Nations, 2016) were considerably more optimistic, with 47% believing that business will take the lead in achieving the UN 2030 Sustainable Development Goals and 78% seeing ways their companies can contribute through their core businesses. They attribute their increased optimism to their view that shared purpose is being achieved in large part due to highly visible initiatives such as the UN multi-stakeholder process for developing these goals and setting up forums for their achievement, and to the salience of sustainability goals that was achieved as a result of the Paris Climate Accord.

Purpose-driven intervention has been a staple of the field of OD, yet achieving change in purposes – especially lasting change – is something we know little about (O'Toole, 2015). We can build on known techniques to catalyze and guide purpose-driven change in small, fertile pockets. We must expand our focus, capabilities, and domains of concern to help organizations develop contexts in which sustainable development rather than simply wealth creation becomes embedded in the actions of and interactions among the participants and stakeholders. Eco-system purpose does not evolve through one-shot events and change initiatives, but rather through the hard work of changing the way stakeholders interact, relate, and operate through time and how they learn together to address the needs of all stakeholders.

Given the power differentials among actors, even strongly integrated, inspirational, and aspirational eco-system intervention approaches do not easily, quickly, or permanently foster development that is viewed as equitable, sustainable, and/or meeting the legitimate concerns of stakeholders. Bringing together representatives with the perspectives needed to design and maintain commitment to a collaborative pathway inevitably involves the painstaking blending of many different values, interests, and purposes. Through experience working together, participants come to understand and eventually begin to incorporate each other's perspectives into their own view of the eco-system and ultimately into their own purposes. It requires approaches that commit participants to eco-system level outcomes, and design processes in which stakeholders co-create how our organizations and societies are designed to operate.

To support this needed transition OD practitioners will have to help organizations and eco-systems incorporate and develop new purposes. This may take the form of consultation to company and multi-organizational initiatives and devising learning experiences where participants begin to question their

assumptions about the single objective function that has guided the development of the global economy. Governments may change regulations, but compliance driven behavior change is only a very small first step toward changing the purposes, outcomes, and impact of organizations (Worley & Mohrman, 2015). For companies that were not founded with a triple bottom line orientation in mind, new purposes gradually become embedded in the way they operate as they go through four predictable stages of: (1) compliance to regulation, (2) engagement in initiatives in which they start and learn to partner with other stakeholders, (3) integration of sustainability focuses into their strategies, formal systems and practices, and (4) proactivity, as they internalize the understanding that they are embedded in multi-stakeholder eco-systems and work collaboratively to advance the sustainability of the full systems in which they operate (Worley & Mohrman, 2015). Consultative support is a long-term engagement aimed at helping multiple stakeholders develop and learn over time as they begin to align around a new eco-system framework with expanded purposes. The emergence of organizations and systems that start up with purposes of sustainable development that deviate from the prevailing economy allows us to learn how such enterprises operate. Supporting and learning from such greenfield development is an area where organizational design professionals have played a strong role (Doeringer, Evans-Klock, & Terkla, 2002; Hanna, 1988). The Ohio local foods system is one example of an emergent system catalyzed by shared purposes. Similar local food systems have become a development focus in many parts of the world, reflecting global concerns with sustainable development (Giovannucci et al., 2012; United Nations, 2015). They aim to address the seemingly intractable problems of resource shortages, global warming, the destruction of the natural environment, breakdown of community, and social injustice.

One hope is that new economic models will emerge that are characterized by organizing strategies that are alternatives to large, growth- and wealth-oriented enterprise strategies, and that stress environmental and social outcomes that are consistent with the constraints humanity is facing (e.g., Schumacher, 1973; Wight, 2015). The Ohio local foods system exemplifies efforts in this direction. The health of these emergent systems has depended on the building of collective capacity through the intervention and support of community organizers, OD experts, agriculture development specialists, business development experts, specially tailored financial mechanisms, and a number of convening agencies and institutions. This loosely connected network fosters, provides support to, and continually reinvigorates the capacity of the local foods eco-system to pursue and enhance its health and sustainability (Mohrman et al., 2016). The intervention "team" is its own eco-system – a loosely connected, emergent network that requires the same kinds of multi-perspective, purpose-driven collaboration capability that is needed in the local foods system that is emerging.

Learning. At the heart of sustainable eco-systems is ongoing learning by design (Shani & Docherty, 2003). Deviating from the dominant economic patterns and perspectives in our societies requires the intentional learning of new behaviors and capabilities that enable different outcomes for individuals, organizations, and entire eco-systems. Shani and Docherty have provided a rich framework of the various mechanisms that enable such complex and ongoing system learning, and they stress that these mechanisms have to be built into the way the organization and/or trans-organization system is designed. Their message is that learning should not be left to chance or dependent on good intentions. In much of the change management literature, learning has been seen as instrumental to implementing particular changes in particular settings rather than as a key enabling dynamic that is integral to sustainable functioning (Worley & Mohrman, 2016). Learning must be redefined to fit the need for dynamic capabilities, defined by Teece, Pisano, and Shuen (1997) as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments." The iterative design process of Satellite Healthcare is an example of a dynamic learning capability that centers around the evolution both of the technical system and the social system in order to continually incorporate new technical capabilities and design new ways of doing work.

The agri-foods cases relied heavily on learning. Ireland's Origin Green transition built in country-wide learning and exchange among farmers, university researchers, government agencies, and company marketing and distribution functions. Its challenge was to reorient a dispersed and relatively unsophisticated industry to fundamentally change its growing practices, introduce new technology, and compete in a global world where the preferences of consumers and country food regulations such as demands for traceability and purity of food were changing dramatically. Google built in a feedback and learning process by which employees could see the progress of the system and assess their own role in helping it achieve its food waste goals. Illy focused on upgrading farmers' capabilities through learning collectives. Semi di Liberta built a supply chain and at the same time, through training, on-the-job learning support and learning-by-doing opportunities, developed the capabilities of convicted felons to manage the full agriculture to consumer value stream. The EU TRADEIT research initiative supported network learning among nascent entrepreneurial food producers. All of these examples linked the learning directly to the challenges and the pragmatic action requirements the participants were experiencing, and opened up new opportunities to populations that may otherwise have remained marginal.

This learning is, for the most part, not carried out through classic training and development, classroom-based approaches. Rather, consultants need expertise in the development of ongoing learning capacity that is built into the way the organization operates, tied to the work processes themselves, and thus enables self-regulation. For greenfield organizations that start up with broad triple bottom line focuses, the challenge is to build the focus on broader social

and environmental purposes into the fabric of the organization's operating structures and processes so that outcomes in those areas are considered simultaneously as business outcomes as the company strives to be financially viable and goes through the dynamic stages of growth and evolution. Each stage of the organization's evolution entails solving the problems of growth and complexity by redesigning and learning new behaviors associated with the desired outcomes (Greiner, 1998). At Ben and Jerry's, for example, the founders' sustainability oriented purposes were put to continual tests by stakeholder challenges to their prioritization of purposes in a larger context that assumes growth and wealth creation to be primary (Edmondson, 2014). When the company experienced the pressures from its growth in size and complexity and changes in leadership, and ultimately became part of Unilever, there was ongoing tension and organizational change as it strove to maintain its commitment to social and environmental sustainability. It went through a rocky period of taking its core values and purposes and translating them into what had become a big company and then a part of a large corporation. To stay the course, start-up organizations as well as organizations that are starting to transition from legacy ways of operating will have to be able to continually learn in order to reconfigure themselves and their relationships within their eco-system and in their changing contexts.

Whole industries, including healthcare and agriculture, are being increasingly disrupted by rapid and ongoing advances in technology that can enhance their effectiveness in delivering value at the same time as bringing discontinuous change that requires entire eco-systems to adjust. These technologies challenge organizations to continually ensure that their development is sustainable and addresses the valued outcomes for stakeholders. An eco-system is sustainable only if it is continually learning and changing. Stakeholders can only have voice and secure equitable treatment if they learn along with the advance of new capabilities that change what is possible. Only then are they in position to influence and be part of the emerging future.

The pressures of continually advancing technology and the turn toward sustainable development mean that the expertize underpinning OD and design intervention methodologies will also have to continuously advance in order to support dynamic capability in organizations and eco-systems. The field of organization development and its practitioners will have to fundamentally reposition and reshape themselves in changing eco-systems in order to be relevant, and to be in a position to impact both the social and technological aspects of sustainable development.

CONCLUSION

Achieving sustainable development will depend on how our organizations, individuals, and eco-systems respond to the challenges we face. We have discussed

examples from healthcare and agri-foods because of their clear and direct relationship to the welfare of humanity, but all sectors have their own domain specific challenges and value streams that need to be redesigned to contribute to sustainable development. The field of OD can be an important enabler of this transition because our core values and methodologies give us purchase on the issues of sustainability and rapid change that the world is facing. To play this role effectively will require moving to the eco-system level of analysis and developing broad skills to deal with eco-system wide development patterns. Intervening in the path dependent trajectory of the global economy to help bend its path toward sustainable development will require the capacity to consult to and guide eco-systems through difficult transitions that entail not only changes in the designable artefacts that define organizations and networks – their practices, structures, incentives, and policies – but also in their purposes. Consultation will extend well beyond discrete interventions, projects and initiatives to focus on developing robust dynamic capabilities and development through time.

The fast-paced advance of technology provides great opportunity and also poses great challenge to sustainable development. Technology has enabled wealth-creating organizations to define the contours of the global economy in ways that have not always simultaneously led to more sustainable development. A needed and natural expansion of focus for the field of OD is to elaborate many of its foundational values and approaches to examine and help shape how technology enables full eco-systems to foster sustainable development. Approaches that interweave technical and social elements will be required to help shape eco-systems where technology is harnessed and designed in concert with social systems to achieve triple bottom line purposes. This will require helping organizations and eco-systems design and implement new socio-technical approaches, as described in the Satellite Healthcare example. If the design and adoption of technology is to promote sustainable development, it cannot be left to the technologists alone. But OD practitioners can contribute in a meaningful way only if they develop sufficient understanding of technology to be able to work effectively in a team with technologists. We will have to develop T-shaped capabilities (Hansen & Von Oetinger, 2001) with a deep understanding of the intersection of advanced technology and social systems.

Much remains to be learned about how best to enable a transition to sustainable development and the new organizing approaches that will embed and achieve new purposes. Research is needed about how to position OD expertise along with the other change expertises in the organization so that they are working with strategy and the business to enable the organizational to rapidly sense the dynamic environment in which they are operating, and pull together multiple stakeholders to respond. This calls for a redesign of the organization to become agile (Worley & Williams, 2014) including the introduction of change capability that is based on foundational principles of learning and engagement (Worley & Mohrman, 2016).

Along with many disciplines and fields of endeavor in today's world, the OD field is being disrupted and, thus, will have to continually upskill and broaden focus. OD practitioners will have to expand their knowledge bases to be able to provide substantive support to organizations that are having to navigate to develop sustainably. Elements of the evolving OD practice will include developing the associated capacities for trans-organizational action, multi-stakeholder collaboration, and socio-technical design in an era of relentless advances of technical capabilities, the redesign of complex and rapidly changing value streams, and the design of learning into the fabric of work and organizational processes. We will have to work collaboratively in the context of multi-functional teams, including through partnerships, smart teams, and cross-organizational alliances to provide design and development services that build new system capabilities for the future. Clearly, developing these new capabilities requires the combination of many knowledge bases, and are beyond the competencies of even the most seasoned solo OD practitioner.

Thus, the eco-system of interventionists will itself have to work differently to combine the deep knowledge of many specialists who must work together with speed and agility to support dynamic change needs. As we can see from the agri-food industry examples, a cross-functional network of many disciplines will be required to shape and support change toward sustainable development. It might include strategists, work process and system developers, technology and industry domain experts, and community and governmental development experts as well as educators. We will have to learn to orchestrate dynamic teams of interventionists that will include stakeholders holding quite varied perspectives and often residing in different organizational settings. The shaping and orchestrating of multi-disciplinary and multiple stakeholder intervention partnerships and working through their often conflicting purposes will be necessary to build an eco-system context that enables the dynamic evolution required for sustainable development. OD practitioners will have to position themselves in a multi-functional network, and develop the capacity to dynamically identify and pull together members with the needed expertize, and learn to operate effectively in cross-functional teams of interventionists.

Achieving progress toward sustainable development will require change in such politically charged issues as the purposes toward which our institutions and eco-systems strive, the distribution of outcomes and benefits among different stakeholders, and the division of attention between current outcomes and long-term sustainability. The challenge is to change the prevailing belief systems, the power distribution, and the political agenda to sustain focus on expanded outcomes. We will have to understand the inherently political nature of our work, of the process and content elements entailed in developing new understandings through ongoing interventions that change the way work is done and the relationships between parties.

The OD expertise required goes well beyond our expertize in convening, reflecting problem solving, and having one-shot success with resetting a

particular organization or sub-system. It will require that we can work with others to create a data information context and the experiences that contribute gradually to altered expectations and beliefs. The development of a digitally enabled healthcare system where patients understand and accept their new role in virtual self-care and where health professionals assume responsibility for the full eco-system of care is a long way away. Achieving sustainability will only happen through gradual, experiential learning, and exposure to a different paradigm of healthcare. This will only happen if the eco-system is designed to address the concerns of all stakeholders. This is both a values statement and a political statement. The design of the system, ongoing iterative improvement based on the experience of participants, and broad exposure and experience with new approaches are integral to change at the eco-system level. To make this happen, we will have to learn how to play and orchestrate the long game.

We have argued that the values and methodologies of OD are essential underpinnings for the methodologies that will be required to achieve sustainable development. In order to impact humanity's capacity to address urgent societal and environmental need, we must learn how to more effectively apply and extend our intervention frameworks to consult to the eco-system, and how to leverage our resources so that our own resources are sustainable. We must become knowledgeable and facile in helping to orchestrate multifaceted, longitudinal, and continuously changing complex systems dealing with a large variety of actors from multiple sectors and with different power bases and interests. In a real sense, this requires a politicization of a values-based field in order to help change the trajectory of history. This is a tall order, and one that requires that we face up to the same pressures that society and our organizations are facing to fundamentally transform ourselves and how we operate.

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