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Collaboratist Leadership in the Industry 4.0 Economy
by Prof Pieter Steyn
& Dr. Brane Semolic

Leading Virtual Dynamic Learning Organizations [1]

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Abstract

The Industry 4.0 economy has seen dynamic capabilities theory emerging as a profoundly important element in creating performance rich virtual dynamic learning organizations (VDLOs) to replace dysfunctional bureaucratic entities. Customer expectations, product and service enhancement, collaborative innovation, and organizational forms are aspects profoundly affected by the new order. Collaborative innovation is of paramount importance for increased competitiveness, as well as, product / service, and concomitant process improvements that inspire new business models and organizational paradigms and structures. To guarantee success it is important having super-transformational collaboratist leaders at the helm.

Key words: Collaboration, Innovation, Collaboratist Leadership, Process Design, Competitiveness, Business Models, Organisational Paradigms and Structures. Business Relations, Collaboration Maturity Model.

Introduction

According to Teece (2007) dynamic capabilities enable business enterprises to create, deploy, and protect the intangible assets that support superior long-run business performance. Dynamic capabilities are defined as an ability to reconfigure, redirect, transform, and appropriately shape and integrate existing core competences with external resources, and strategic and complementary assets to meet the challenges of a time pressured, rapidly changing world of competition. He describes the micro-foundations of dynamic capabilities as distinct skills, processes, procedures, organizational structures, decision rules, and disciplines, which support enterprise-level sensing, seizing, and reconfiguring capacities that are difficult to develop and deploy. Teece (2007) avers that enterprises with strong dynamic capabilities are intensely entrepreneurial. They adapt to business ecosystems, and shape them through innovation and through collaboration with other enterprises, entities, and institutions.

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Cetindamar et al (2009) aver that technological enhancements continuously create challenges and opportunities for new product development and industrial development diversification. They believe that such opportunities need to be captured and converted into value through effective and dynamic technology management. But a new way of understanding technology management, capturing its dynamic nature and the managerial features are required. This, they believe could be captured through an appropriate paradigms or perspective for understanding technology management through dynamic capabilities theory. They believe that technological changes continuously create new challenges and opportunities in product, service, process, and organisational development, which requires new ways of understanding the very important supporting managerial aspects. Semolic and Steyn (2017, September and 2018, August) concur and believe that the latter is an extremely important strategic leadership issue in the Industry 4.0 economy.

The traditional approach to leadership sees the concept as strategic, and as a social influencing process being exerted over people. In an organisational context the latter refers to a person's subordinates within a team. As CEO it refers to a person's influence over employees within an entire organisation. Hence, the focus is on human capital as key value creator. The period before and during the emergence of the Industry 4.0 economy was accompanied by growing competitive intensity in the business environment and increasing complexity of organisations. The focus shifted to include creating internal and external leadership capacity that aims to effectively meet the situational challenges of the day.

The challenge became increasingly to define corporate strategy and build a supportive organisational climate and culture that promote customer service excellence and more leadership collaboration. In this context leadership is defined as the ability of the CEO as leader to effectively foster the appropriate habits of visionary companies through a well-developed strategy-based Balanced Scorecard, and applying project and program management to achieve the organisation's mission (Steyn and Zovitsky, 2018). Strategy and organisational structure were seen as a second set of variables making up the concept of leadership as regards the ability to provide vision, mission and focus.

According to Steyn and Schmikl (2016) leadership is about engendering passion with followers, and inspiring those that you lead to rise to greater heights they would not achieve by themselves. Leadership is the skill of journeying in the hearts of those that you lead and building an organisational mind-set, knowing that all actions flow from people. People's motivational levels and attitudes play an important role in leadership success. Moreover, leadership is about goalsetting processes, ensuring value add that

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will bring growth to the organisation and its people, and developing people's talents through education and training to best serve the organisation (Schmikl, 2018). Leadership is also about coaching and mentoring, and giving strategic direction to those that you lead in order to enhance the organisation's experience curve.

Research in the pre-industry 4.0 decades saw attempts to find a generically successful competency-based leadership profile, or whether different competency profiles are required for different situations, industries, or organisations. This line of thought was followed by the Ohio State leadership studies (1950s onwards), Tannenbaum and Schmidt (1958), Blake and Mouton (1982), and Hersey and Blanchard (1988). Moreover, the leadership approach of, *inter alia*, Covey (1989), Kolbe (1990), Wheatley (1999) and Zukav (2000) that followed, viewed the leadership concept as some uniquely acquired personality trait and style that ensure the leader's success, focussing on cognitive (how one reasons) and conative (how one operates) talents. However, the resulting body of knowledge generated needs to be repackaged and presented with more clarity in view of the aspects influenced by the current Fourth Industrial Revolution (Industry 4.0) economy.

Covey (1989) predicted that *interdependence*, which basically means working with others, was an important imperative that will grow even more in stature over time. In the Industry 4.0 context interdependence refers to *collaboration*, which has indeed become a very important factor in the way today's organisational forms operate. Modern organisations rely progressively more on partnering with other entities. Steyn and Semolic (2016) aver that organisations, in order be to be more competitive, are progressively adopting strategies that focus on their *core business*. They consequently build their internal capacities based on core competencies, while partnering with other organisations for non-core components that constitute their final products and/or services. In this way a virtual network of partner organisations is formed with the purpose of timeously providing high quality products and/or services at the lowest possible cost. The authors stress that this approach calls for higher levels of coordination, integration, and collaboration in the resulting network of partners in order to achieve synergy.

As alluded to above, in the complex Fourth Industrial Revolution (Industry 4.0) economy organisations collaborate with inter-organisational partners in virtual networks, focusing on their core business and competencies, while partners perform non-core tasks (Semolic and Steyn 2017, September). In partnering they first seek candidates closest to them before moving regional, national or global. This stimulates growth of small and medium sized enterprises, and job creation in their immediate vicinity. Steyn and Semolic (2017, March) aver that the Industry 4.0 approach espouses the view that leadership constitutes a collaborative and creative journey with people, defining this as *"collaboratist*

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leadership". They define *"collaboratism"* as a leadership, management, and governance system related to partner organisations operating in a virtual network business model to create, produce, and deliver products and/or services to customers in the marketplace. The system is characterised by an initiating organisation acting as the principal partner in the virtual network of participating organisations, and founded on project, programme, and portfolio management principles.

The Industry 4.0 Economy

The World Economic Forum identified four aspects most affected by the Industry 4.0 economy as *customer expectations, product (and service) enhancement, collaborative innovation,* and *organisational forms.* Successful Industry 4.0 entities bring major organisational transformation and change across all four of the abovementioned aspects and are led by *collaboratist leaders* who are super-transformational with respect to behavioural, operational, and structural strategies. Such leaders are blessed with a 4.0 mindset, and through role-modelling excellence, they motivate staff members to follow suit and become skilled at creating, acquiring and transferring new knowledge and insights. Employees and partner resources operate in high-performance teams where good communication and information flow flourish. Behavioural change that positively affects mindsets is crucial for success, and results in the creation of *virtual dynamic learning organisations (VDLOs)* with a performance-oriented culture free from bureaucratic burdens.

Steyn and Semolic (2017, March) aver that an important action of leadership is to define the value system which embeds the organisation's values, beliefs, and guiding principles. The guiding principles constitute the total quality management philosophy principles adopted by the organisation to aid their operations in all the processes of the value chain. The value system dictates the preferred organisational culture adopted through the guidance of the executive leaders. The leadership process creates potential for high-performance teams by building on the strengths of team members, while the management process entails achieving the organisation's strategic goals through efficient planning, organising, workflow, information control and budgeting.

The preferred organisational behaviour and culture are informed by the value system of the organisation. Its values, beliefs and guiding principles form the basis for achieving an organisation's vision and mission (Steyn, June 2010). Industry 4.0 collaboratist leaders are guardians of the value system, requiring them to role-model the preferred organisational culture and behaviour. This has the effect of preventing bureaucratic behaviours where employees blame one another and continuously make excuses for

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failures. Moreover, staff members are transformed to a 4.0 mindset of cooperation, collaboration and team-based success.

Effective collaboratist leadership role-modelling encourages positive perceptions with followers with respect to creating an organisational climate conducive to high motivation. This is crucial for achieving performance excellence; hence collaboratist leader role-modelling strongly focusses on the eight dimensions of a psychological climate identified by Koyes and DeCotiis (1991). These dimensions are trust, support, innovation, cohesion, autonomy, recognition, fairness and pressure, all of which are affected by leadership behaviour. Moreover, due to the profound influence exercised by the Industry 4.0 economy on *customer expectations, product and service enhancement, collaborative innovation,* and *organisational forms*, collaboratist leaders pay special attention to the first five dimensions.

Organisational Climate, Culture and Industry 4.0 Collaboratist Leadership

High staff motivation results from a positive organisational climate. Koyes and Decotiis define organisational climate as comprising a set of relatively enduring characteristics that describe a particular work environment, and distinguish it from work environments in other organisations. At the organisational level it serves as internal barometer pertaining to both organisational structural and leadership variables or values. At the individual level it is perceived as a psychological climate. Leaders have a major responsibility to foster and build the organisational "climate and culture". The two concepts are related, but not the same.

The concept "organisational climate" refers to a set of measurable variables which arise from the components of organisation structure, and positively, or negatively, impact employee motivation and commitment to performance. Koys and DeCotiis (1991) developed a useful measuring instrument for determining an organisation's climate by aggregating the psychological climate of individuals constituting the workforce. The concept "organisational culture" was extensively explored by Deal and Kennedy (1982). They examined organisational cultures and found that values and beliefs constituting the value system formed the core (or soul) of an organisational culture. Hence, the value system dictates the preferred organisational behaviour.

The results of an Organisational Climate Study, performed as part of a transformation and change initiative conducted by current co-author Pieter Steyn in an organisation (engaged in welfare work) employing 2500 people, are shown in Figure 1. The psychological climate dimensions Trust and Support combined as a single factor

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(trustworthy supportiveness) in the statistical analysis performed, with an Eigen-value of 42.44. Eigen-value is a statistical measure of profoundness, the higher the value the more profound the factor (Steyn and Schmikl, 2016).

When compared with the Eigen-values of the remainder of the factors, trustworthy supportiveness is by far the most profound in the minds of respondents and underscores the importance of leaders adopting a behaviour promoting it. The results also show (see Figure 1) that respondents in the said organisation perceived Innovation (5.63) as the next most profound factor, followed by Cohesion (3.94), Autonomy (3.55), etc. These results then acted as a guideline for leaders in the transformed organisation to adapt their role modelling in order to create positive perceptions with followers in the quest to achieve high motivation and performance.
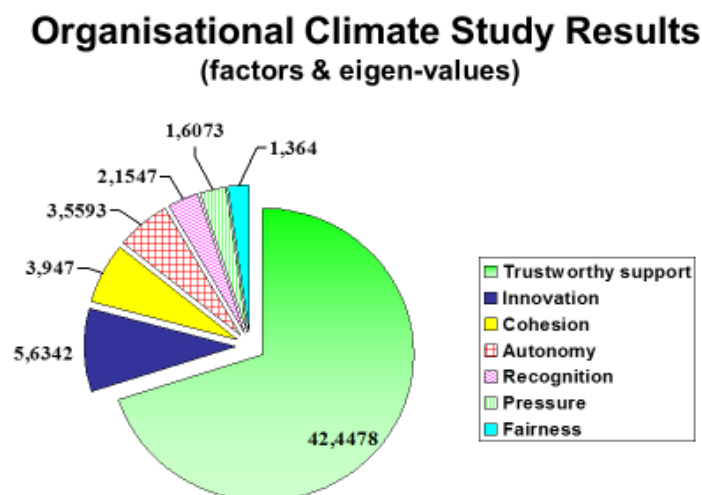

Organisational Climate Study Results
(factors & eigen-values)

Figure 1: Results of an Organisational Climate Study performed by current co-author Pieter Steyn in a Transformation and Change Initiative.

Trust is an all-important dimension of organisational climate. As previously alluded to, a breakdown of trust immediate results in a breakdown of communication, which leads to dire consequences for understanding and being understood. Empathic listening must be utilised to genuinely understand what people are trying to convey, will compel them to reciprocate the listening, and encourage them to be open-minded to influence. Trust is then further enhanced leading to effective collaboration.

Trust is the perception of freedom to communicate openly with members within a team, and at higher organisational levels, about sensitive and personal matters with an

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expectation that integrity of the communication content will be respected and not violated. *Support* is the perception of the tolerance of team member behaviour by superiors, including the willingness to let them learn from their mistakes without fear of reprisal. In the Industry 4.0 economy it is of paramount importance that trust is built through supportive relationships influenced by collaboratist leadership, which in turn impacts employee attitudes**.** Trust has five valuable sub-dimensions:

> *Integrity:* of which ethics, honesty and truthfulness are important components. Appointing effective and efficient virtual networks of partners is essential in the Industry 4.0 economy. If ethics, honesty and truthfulness are absent, greed becomes paramount and corrupt practices may result.

> *Competence:* talent-based interpersonal and technological knowledge, wisdom and skills. The Industry 4.0 economy calls for collaboratist leaders who possess *phronetic intelligence* (practical wisdom and knowledge) and technology maturity. These elements are discussed in more detail to follow.

> *Consistency:* reliability, good judgement in handling situations. Having collaboratist leaders on board who possess *phronetic intelligence* is again profoundly important for Industry 4.0.

> *Openness:* willingness to share ideas and information freely. Collaboratist leaders of virtual dynamic learning organisations (VDLOs) operating in open innovation business eco-systems in the Industry 4.0 economy are essential for success in the Industry 4.0 economy.

> *Loyalty:* willingness to protect and save face for a person.

The results of the organisational climate study confirmed that trust and support are positively correlated and collectively have the biggest impact on ensuring a positive (or negative) organisational climate.

Hence, it can be argued that the profound influence of *trustworthy supportiveness* on follower commitment is also patently crucial for success in Industry 4.0 virtual dynamic learning organisations operating in open innovation business eco-systems.

Innovation, so vitally important in Industry 4.0 economy, is the perception that change and creativity are encouraged, including prudent risk-taking into new areas, or areas where the member has little or no prior experience. Innovation relates to the concept of leaders encouraging team members to apply their creativity in the work situation.

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Cohesion is the perception of togetherness or sharing within the organisational setting, including the willingness of members to provide material aid in respect of their team roles. Hence, cohesion relates to the concept of teamwork as influenced by leadership behaviour, and is extended to virtual networks of partners in the Industry 4.0 economy situation.

Autonomy is the perception of freedom of self-determination with respect to work procedures, goals and priorities within teams and team roles. Autonomy relates to the Total Quality Management concept of empowerment and involvement of team members, as influenced by leadership behaviour. In the Industry 4.0 economy situation teamwork is extended to virtual networks of partners where autonomy is of utmost importance.

Collaboratist Leadership and Aspects most Influenced by Industry 4.0

It can be argued that *collaborative innovation,* one of the four aspects most influenced by the Industry 4.0 economy, is only performed successfully where a *trustworthy supportive* climate encouraged by *collaboratist leaders* prevails, while utilising *cohesive* virtual teams of partners who enjoy substantial *autonomy.* Moreover, *collaborative innovation* is directly linked to *product and service enhancement,* another aspect most influenced by the Industry 4.0 economy*. Enhancement* is related to innovative product, service and process design and development to satisfy *customer expectations,* which is a further aspect most influenced. Hence, all the above elements are highly profound *collaboratist leader* characteristics to possess in Industry 4.0. The remaining dimensions, i.e., fairness, recognition and pressure, all having been highly prevalent in the servant-leadership era, are also relevant to collaboratist leadership but less profound.

Collaboratist leadership flourishes in open innovation ecosystems where modern business models and *organisational forms* are the order of the day. *Organisational forms* constitute the fourth aspect most affected by the Industry 4.0 economy. *Collaboratist leaders* are super-transformational with respect to behavioural-, operational-, and structural strategy, and need to display technology maturity. Key enabling technologies (KETs), *inter alia*, artificial intelligence (AI), internet of things (IoT), and robotics, largely influence the design of production and service processes constituting Industry 4.0 **organisational forms** that are shaped cross-functionally and require to be program-managed (Steyn and Semolic, 2018,). Hence, a key success factor is for *collaboratist leaders* to possess sound project- and program management acumen, while intellectually stimulating virtual teams of own and partner members to conform to this phenomenon (Steyn and Semolic, 2019).

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Moreover, with respect to *customer expectations* project- and program management acumen delivers a crucial customer focus; regarding *product and service enhancement* the required innovative continuous improvement projects; regarding *collaborative innovation* the dynamic agile learning mindset in the culture of the organisation; and finally, it delivers the matrix methodology to lead, manage and govern the cross-functional processes of new *organisational forms* and its associated virtual networks of partners in the Industry 4.0 business ecosystem (see Figure 2). It is patently clear that a collaboratist leader possessing project and program management acumen is the catalyst for organisational success in the Industry 4.0 economy. Steyn and Semolic (2016, Feb.) stress that having a Chief Portfolio Officer at the executive level of the organization profoundly improves this acumen.
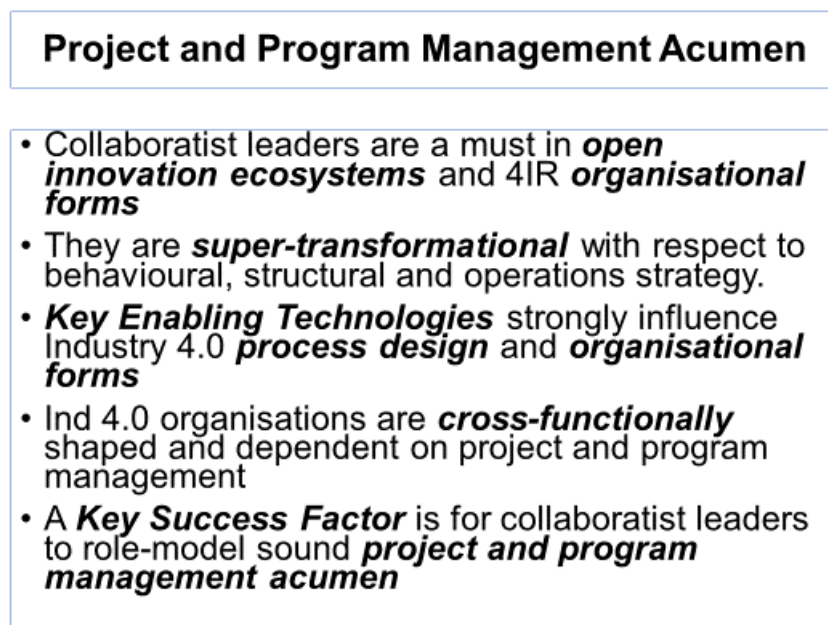

Project and Program Management Acumen

- Collaboratist leaders are a must in *open innovation ecosystems* and 4IR *organisational forms*
- They are *super-transformational* with respect to behavioural, structural and operations strategy.
- *Key Enabling Technologies* strongly influence Industry 4.0 *process design* and *organisational forms*
- Ind 4.0 organisations are *cross-functionally* shaped and dependent on project and program management
- A *Key Success Factor* is for collaboratist leaders to role-model sound *project and program management acumen*

Figure 2: Collaboratist Leaders and Project and Program Management Acumen

Collaboratist Leadership and Innate Talent

The discovery and advances in social sciences research, in particular the branches of psychology, brain neurology, and emotion, are enabling a rethink of previously reinforced beliefs regarding human behaviour (Steyn and Schmikl, 2016). The ability to provide effective leadership to Industry 4.0 organisations, project teams, and followers appears to be dependent on innate talent (knack). All human beings are blessed with some degree of intelligence. Industry 4.0 collaboratist leaders need to be endowed with

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profound *cognitive intelligence* (reason and perception); *instinctive intelligence* (the conative aspect); *emotional intelligence*; and *phronetic intelligence* (practical wisdom and knowledge).

Oosthuizen (2019) avers that Industry 4.0 leaders should develop **'*phronetic intelligence'*** to become 'phronimoi', meaning able to synthesize "knowing why" with "knowing how" and "knowing what" as a goal to be realised for the common good. His opinion is based, *inter alia*, on research findings by Dimitris Bourantas that experience gained by practical wisdom and knowledge enables phronetic individuals (the so called 'phronimoi') to "see beyond isolated facts, to think beyond linear logic, and to appreciate the whole, recognizing the limitations and relativity of all perspectives and knowledge, so that they may make a decision for the common good".

In the Industry 4.0 economy collaboratist leaders intuitively have to cope with knowing "why things are happening", "how to proceed dealing with it", and "what needs to be done" to mitigate risk and achieve performance. The current authors stress that from a strategy implementation perspective "who should do it" and "when" must be added (see Figure 3). Thus, collaboratist leaders blessed with profound *phronetic inteligence* are indispensible in Industry 4.0 organisations.

Phronetic Leadership

Strategically collaboratist leaders intuitively have to cope with knowing:
• "Why things are happening"
• "How to proceed dealing with it"
• "What needs to be done"
And for strategy implementation also:
• "Who should do it", and
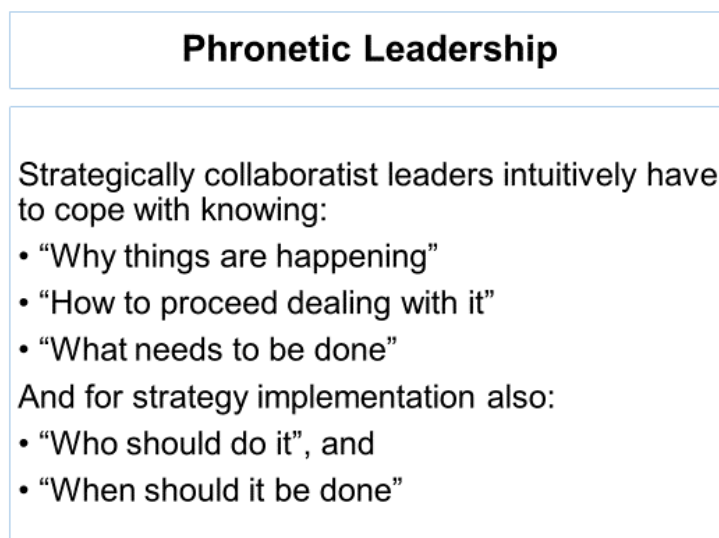• "When should it be done"

Figure 3: Collaborative Leaders possess Phronetic Intelligence

It can be argued that to achieve success in Industry 4.0 organisations, superior strategic collaboratist leaders equipped with the abovementioned innate talents should display a host of other important characteristics (see Figure 4). These constitute the ultimate

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talents that modern day organisations need to become highly competitive and achieve superior performance. Moreover, innovative governance and creative organisational structures and mindsets led by collaboratist leaders ensure high levels of collaboration and synergy.

Collaboratist Leadership Characteristics

• Expectation-focused	• Focus on customer expectations and virtual team needs
• Empathy	• Move from apathy to empathy with all team members and partners
• Adaptiveness	• Support individuals and organisations to adapt to changing environments and effectively respond to problems
• Flexible mindset	• Promote agile, flexible organisation forms and emergent strategic outcomes
• Systems thinking	• Investigate the relationship between all elements, use feedback and knowledge to identify symptoms of risks
• Creative thinking	• Inspire collaborative innovation, original ideas and new insights
• Super-transformational	• Effect change through commitment to vision and values
• Collaborative innovation	• Support individuals and organisations to adapt to changing environments and effectively respond to problems
• Autonomy-focused	• Encourage decentralisation decision-making in teams and virtual networks
• Cohesion-focused	• Demonstrate validity by cultivating sincere relationships in own teams and virtual network team members
• Visionary intelligence	• Has cognitive intelligence (reason and perception); instinctive intelligence (conative aspect); emotional intelligence; and phronetic intelligence (practical wisdom and knowledge)
• Commitment	• Commitment to growth of people beyond their allocated work roles

Figure 4: Collaboratist Leadership Characteristics

Following from the above discussion the collaboratist model of leadership pertaining to a *virtual dynamic learning organisation (VDLOs)* can be illustrated as shown in Figure 5. There is a cause and effect relationship between an organisation's culture, leadership behaviour, the effects that leadership behaviour has on followers and work groups, and the outcomes for the organisation. The model clearly demonstrates how transformation towards a learning culture brought about by *collaboratist leaders* benefits the performance outcomes of the organisation.

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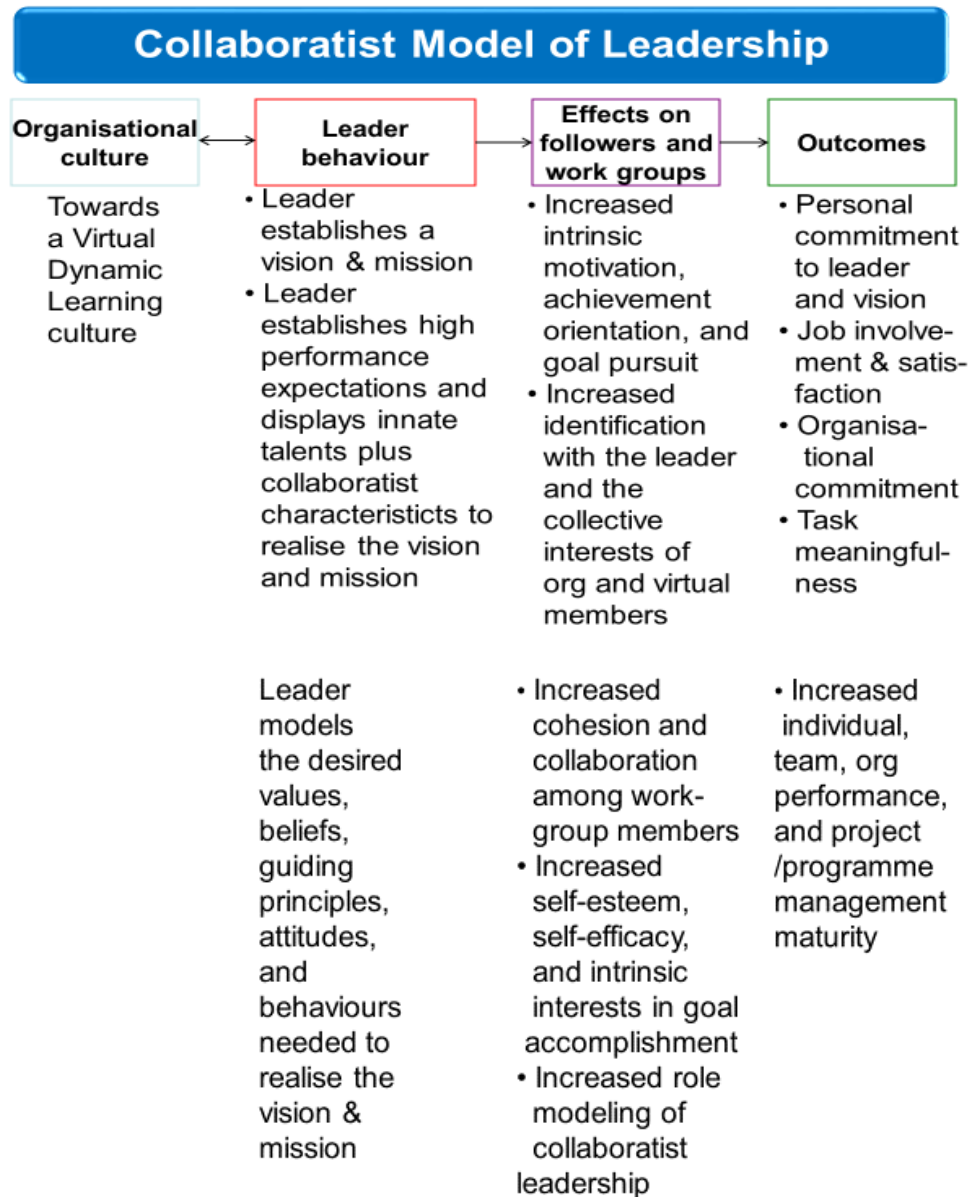& Dr. Brane Semolic

Figure 5: Collaboratist Model of Leadership

For virtual dynamic learning organisations to achieve ultimate success in the Industry 4.0 economy, superior *collaboratist leadership* is of paramount importance. It constitutes the most valuable asset of modern-day organisations, enabling them to become highly competitive and achieve superior performance through innovative governance, creative organisational structures, collaboration and synergy.

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Virtual Dynamic Learning Organisations Business Relations

Virtual dynamic learning organisations (VDLOs) are open agile, highly-adaptive complex systems with the portfolio of business relations embedded in their business ecosystems. Investopedia avers[2] that business relations are the connections that exist between all entities that engage in commerce. That includes the relationships between various stakeholders in any business network, such as those between employers and employees, employers and business partners, and all entities businesses associate with.

Semolic (2019) avers that three main types of business relations are recognised in VDLOs. These are (Figure 6):

- Open market business relations,
- Cooperative business relations, and
- Collaborative business relations.

The main characteristic of an *open market business relation* is openness to all business actors present in the perceived market who can fulfil the client's requirements. The regulators of such business relations are general standards identified and provided by governments on the national and international levels. This business relation type is based on the "free decisions" of active business actors on the demand and supply side.

Cooperative business relations are based on short or long-term agreements between business actors in providing specific products or services. Such products or services can be standard or customised to the client's specific needs. This type of business relations is regulated by specifically customised agreements between clients and suppliers. The national and international standards, which regulate industry activities, are presenting general frameworks for that kind of deals. The client holds the parent position in this hierarchical business relationship. Typical users of these cooperation business relations in various industry supply chains exist, like the industry of household appliances, automotive industry, aerospace industry, etc.
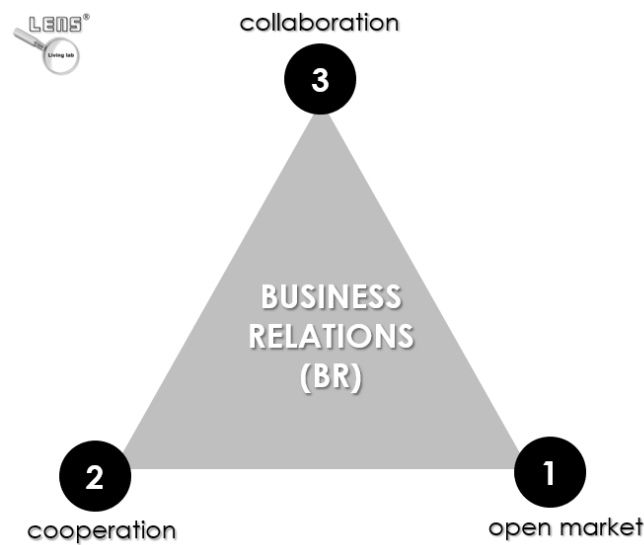
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[2] *https://www.investopedia.com/terms/b/business-relations.asp*

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Figure 6: Types of business relationships (Semolic, LENS Living Lab®, 2019)

Collaboration[3] is the third type of business relations. This is base on a partnership agreed upon by two or more persons or organisations who see business opportunities in collaboration. In collaborative business relations all partners involved are equal. Roles, responsibilities, and authorities are determined by personal and organisational competencies, recognised by the partners.   The governance and coordination of such VDLO business relations are based on the collaborative agreement accepted by all collaborative partners. Typical examples of the use of collaborative business relations are areas of industry research and innovation.

Collaborative business relations are critical for the success of an Industry 4.0 organisation.   Continuous product innovations, and searching for new technology applications based on highly digitalised technology and business processes integrated into organisational and inter-organisational supply and value chains, are critical success factors (Semolic and Steyn, 2017 September). This goal cannot be achieved solely by the use of an organisation's limited resources. The latter simply cannot cover all areas of demanded innovation applications and expertise. The real challenge is how to incorporate and utilise the potential of partners available in the business ecosystem. The solution lies in the utilisation of new business models based on open innovation and different forms of collaboration with partners and stakeholders.

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[3] *Cambridge Dictionary defines collaboration as the situation of two or more people working together to create or achieve the same thing (Cambridge Dictionary, 2020)*

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Figure 7 illustrates business relations (BR) types, its application areas, and its time frames.

No	BR Type	BR Application Areas	BR Timeframe
1	Open market	According to current needs	When needed
2	Cooperation	Supply chains	Short or long-term
3	Collaboration	Value chains, Research & Innovation Communities	Short or long-term

Figure 7: Business relation (BR) types, application areas, and timeframes
(Semolic, LENS Living Lab® 2019)

The stable business environment and relatively long product and technology life-cycles led organisations of Industry 3.0 to focus primarily on operational issues, and mostly utilising the first and second types of business relations.

Collaboration surfaced in the digitalised, technology advanced, and complex Industry 4.0 business environment where all actors need to continuously research and innovate both technologies and their organisations (Semolic and Steyn, 2018 August). Due to limited own resources and knowledge, partnerships with external actors became a necessity.

Steps Towards Collaboration Maturity

Collaboration, which is emerging in many forms of virtual communities, is a growing "buzz-word". The big issue is the depth and quality of partnerships. This phenomenon is illustrated by comparing the use of the term "friend" in social networks. For example, in the case of Facebook few "friends" are actually real friends. The remainder are "members-only" who are not fully trusted. This leads to the question on how solid collaboration with our business partner(s) really are?
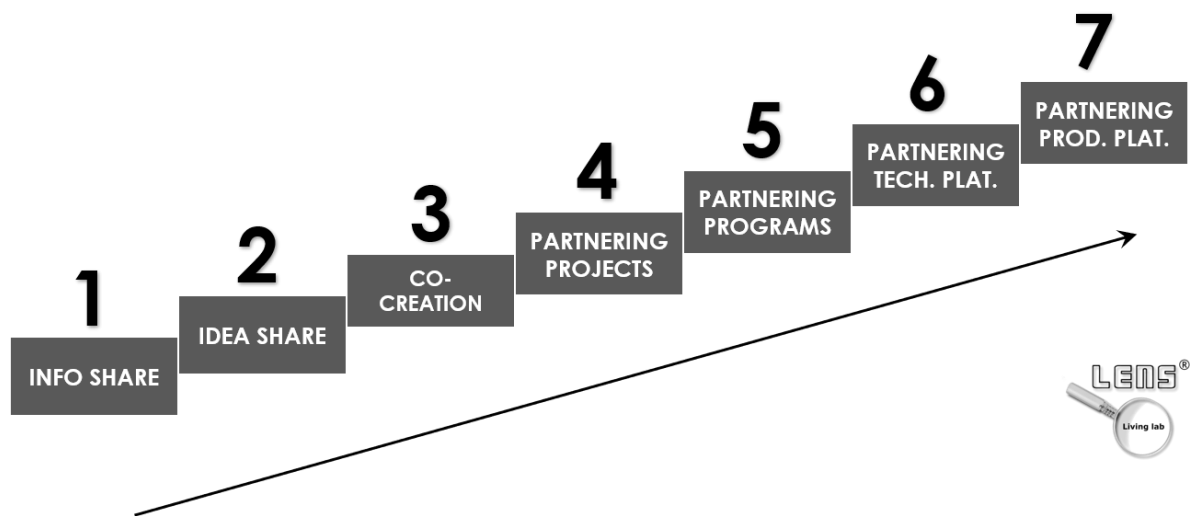
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Figure 8: Collaboration maturity steps (Semolic, LENS Living Lab® 2019)

The seven (7) steps towards collaboration maturity recognised by the LENS Living Lab® methodology (Semolic, 2019), as follows (Figure 8):

- *Step 1: INFO Share* – mutual sharing useful data and information relevant for continuous improvements of existing and development of new products, services, technologies, and operations;

- *Step 2: IDEA Share* – sharing ideas on how to improve existing or create a new product, service, technology, business process, organization, and related businesses;

- *Step 3: Co-creation Start* – partnering in co-creation of new research, technology and development scenarios, or improvements of the existing ones; partnering projects' business cases development;

- *Step 4: Partnering Projects* – successful performance and completion of collaborative research, innovation, and development projects. All project partners and their stakeholders evaluate their success rate;

- *Step 5: Partnering Programs* - successful performance and completion of collaborative research, innovation, and development programs. All program partners and their stakeholders evaluate the success rate;

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- *Step 6: Partnering Technology Platforms[4]* – efficient and effective collaboration in research, innovation, development, and commercialisation of a partnering technology platform. The stakeholders' satisfaction and market success are the primary measures of its success;

- *Step 7: Partnering Product Platforms[5]* - efficient and effective collaboration in research, innovation, development, and commercialisation of a partnering product platform. The stakeholders' satisfaction and market success are the primary measures of its success;

Critical collaboration driving forces and issues for successful partnering are collaboratist leadership combined with *phronetic intelligence, trustworthy supportiveness, integrity, competence, consistency, openness, and loyalty*. As alluded to earlier, poor leadership cannot generate an environment for successful collaboration.

Figure 9 shows the prioritised list of problems and challenges, as recognised by the international community members and stakeholders of the virtual living laboratory LENS Living Lab® (Semolic, 2020).
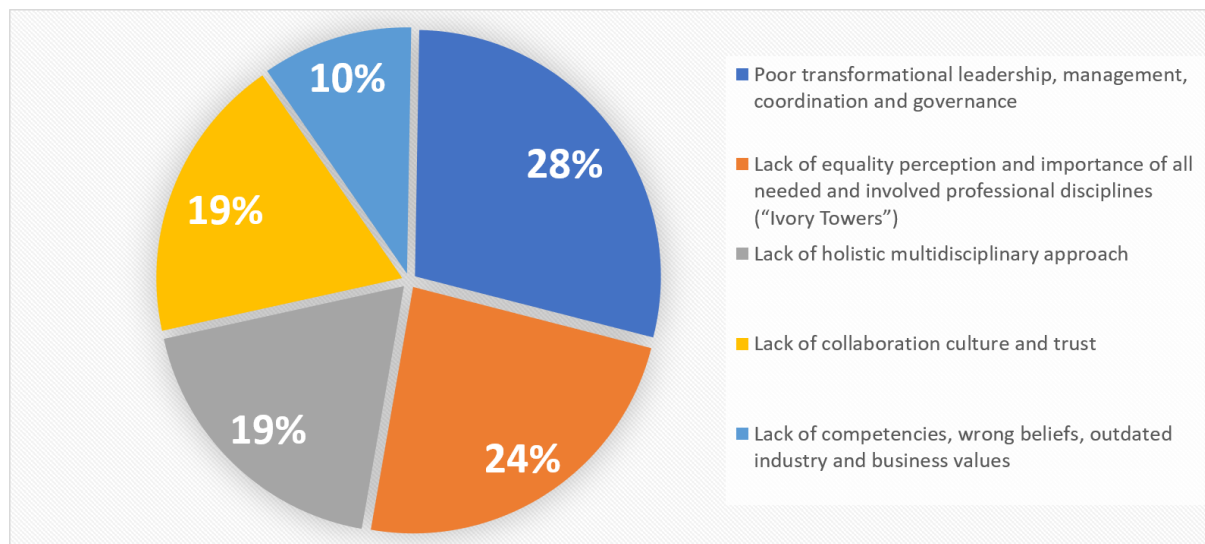

Figure 9: LENS Living Lab's international survey of problems and challenges by Brane Semolic, co-author of this article

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[4] *Technology platform identifies and defines specific areas of technologies, related technology solutions, features, tools, methodologies, and supporting services, relevant for the development of related industrial applications*

[5] *Product platform is common design, formula, or a versatile product, based on which a family (line) of products is built over time (Source: Business Dictionary, 2020).*

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Conclusion

The foundation of *dynamic capability* is for it to be embedded in the values, beliefs and guiding principles constituting the organizational value system, and the leaders' effective role modelling abilities to create paradigms and structures that motivate managers and followers to efficiently achieve strategic organizational benefits. The value system contains the profoundly important beliefs of trust and openness, as also the guiding total quality management principles of customer focus, innovative continuous improvement, employee empowerment, and knowledge-rich systems thinking, which are all of paramount importance for organizational performance and development in today's open innovation business ecosystems.

A major contemporary challenge is achieving genuine sustainable collaborative and partnership business relations, and is a compelling reason for entities to transform and change to *virtual dynamic learning organisations (VDLOs)* guided by collaboratist leaders. Industry 4.0 collaboratist leaders are indeed guardians of the value system that dictates a dynamic organisational culture and behaviour. Moreover, truly sincere partnerships cannot be achieved overnight. It takes time for networking partners to establish collaborative standards and foster the creation and development of sustainable open innovation communities.

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