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Critical Thinking Skills

David L Loseby MCIOB Chartered, FAPM, FCMI, FCIPS Chartered, FRSA provides an overview of critical thinking skills to support your procurement career, critical thinking skills with origins from 500 BC into industry 4.0.
First Edition: September 2019.



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Critical Thinking Skills

Critical thinking skills is a rich concept that has its origins from 500 BC, with the term “critical thinking” being more recognisable and researched in the mid-late 20th century.

You may have heard or come across the term in recent reports from a number of sources from journals, research papers to management periodicals. In this knowledge paper I hope to be able to outline the transdisciplinary concept of critical thinking, its origins and how and where this skill is being sought to develop greater value for organisations.

The earliest documentation of critical thinking are the teachings of Socrates recorded by Plato. Socrates established the fact that one cannot depend upon those in "authority" to have sound knowledge and insight. He demonstrated that persons may have power and high position and yet be deeply confused and irrational. He established the importance of asking deep questions that probe profoundly into thinking before we accept ideas as worthy of belief.

In writing this I recognise that envisioning the concepts and approach of critical thinking is not easy but do persevere as the rewards are great! In approaching this subject, I recommend this is read from start to finish and then re-read to enable the knowledge acquirer the opportunity to review and critique their own thinking and comprehension of the concepts and principles as the acquisition of the skill itself is by nature complex.

Therefore, defining what we mean by this may be a good starting point. Further, at every level, in an organisation whether, public, private or third sector its use is relevant wherever there is a need to challenge the current state of affairs and create new ways of working that enhance value to ideally all parties impacted or touched. I will return to some of the more specific linkages at a later stage in this knowledge paper.

Setting out a clear definition of the critical thinking skills is paramount to gaining an understanding of what it is we expect at all levels of the procurement and contracting community to acquire a core competency, especially if we want to be effective and deliver a competitive advantage, irrespective of the sector we work or serve in.

There are current commonly recognised four thinking concepts as a basis for coding the models being used;

- Thinking processes (to include skills and strategies)
- Metacognitive thinking
- Thinking dispositions; and
- Knowledge and learning (mindsets and beliefs)

Critical thinking essentially has two distinct components:

1. a set of information and belief generating and processing skills; and
2. the habit, based on intellectual commitment, of using those skills to guide behaviour.

It is therefore contrasted with:

- A. the mere acquisition of and retention of information alone, because it involves a particular way in which information is sought and treated;
- B. the mere possession of a set of skills, because it involves the continual use of them; and
- C. the mere use of those skills (as a performed linear exercise) without acceptance of their results.

As outlined in another knowledge paper (soft skills: Behavioural procurement), we all have heuristics and biases and as such need to have truly understood the impact and influence these may have on our thinking. The idealistic approach is that of zero biases and a clear understanding of the heuristics gained through our lives and career that are material to the considerations before us.

I will now turn to providing a definition from an evidenced source to complete the baseline of this skill;

Definition

Critical Thinking is the intellectually disciplined process of actively and skilfully conceptualising, applying, analysing, synthesising, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief or action. In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth and fairness.¹

¹ The National council for Excellence in Critical Thinking, Michael Scriven & Richard Paul, 8th Annual International Conference on Critical Thinking and Education Reform, 1987.

This may all sound very complicated so perhaps time to try and simplify the skill and break it down from its more recent popularity and centric area of education.

Setting out critical thinking concepts and approaches in a more visual way it can be seen as illustrated in the figure 1 below;

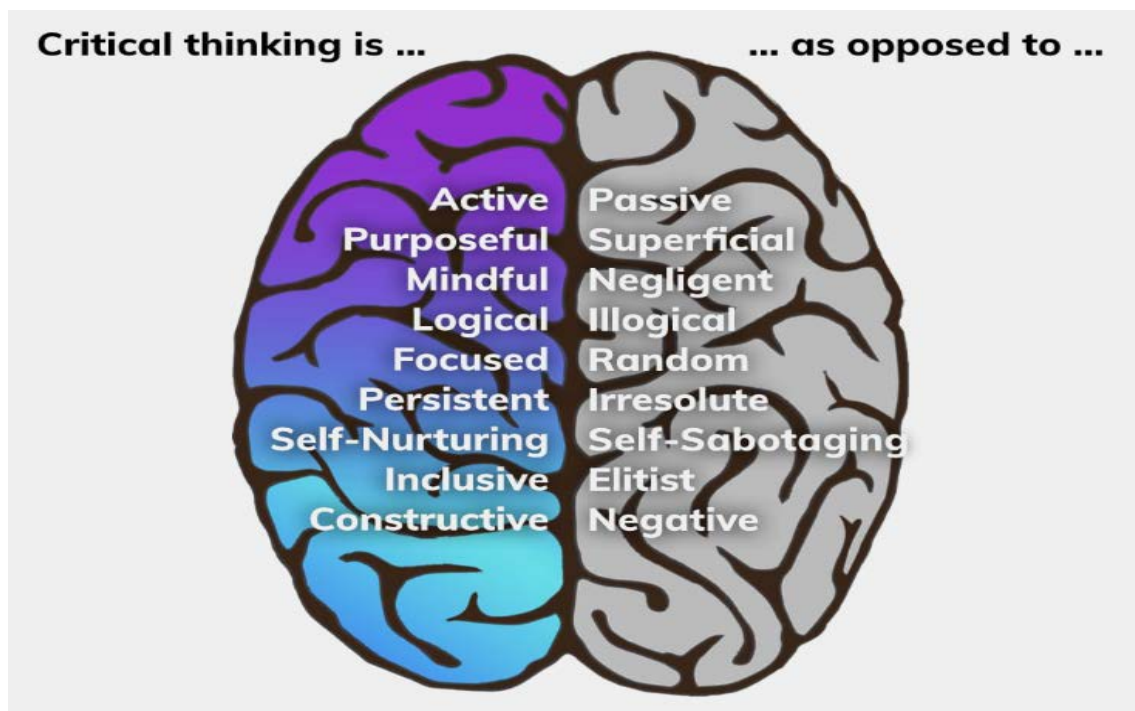


Figure 1 – Principal contributors

At its simplest level critical thinking should seek to;

- Challenge held beliefs and assumptions
- Provide diversification of thought
- Providing thought and observation without bias
- Reason though logic: don't accept (but understand the why, how, what, where, when, etc.) a set of data or information.

Context and considerations

In April 2019 Deloitte published their study entitled “Seasoned explorers: How experienced TMT organisations are navigating AI – Insights from Deloitte’s State of AI in the Enterprise, 2nd Edition”, which posed the question ***why do high innovators value critical thinking skills more;***

Seventy one percent (71%) of respondents strongly believed that autonomous technologies will augment the efforts of human workers, while only twenty nine (29%) think that technologies will replace humans (for less innovative organisations, the belief in augmentation is lower at 61%). While algorithms are getting better at making recommendations and drawing conclusions, the uniquely human skills of judgement and critical thinking are still essential for interpretation and final decision making. A clear parallel and signpost for procurement to have these skills well developed and part of their offer to the business community.

Moving out of your comfort zone is the first step, secondly recognising that you do not have exclusivity to how the world of business should work or operate. Engaging with all areas of the business, from all levels and disciplines will help you begin to gain a richer understanding of the business and internalise what is being said with an open mind.

Avoid the risk in meetings to dominate with how you see the outcome of the project and allow others to share their views and opinions. As highlighted in another knowledge paper, soft skills: behavioural procurement, avoid groupthink, by getting people to input independently and directly to you and aggregating and anonymising the inputs in a coherent structured analysis.

Principle purpose(s)

In essence the procurement professional can bring new skills to the challenge of value creation and the role of ***value architect*** in the guise of the CPO to procurement analyst and everything in between. Fostering the ability to think critically, as opposed to simply following a process e.g. category management without considering the potential and options of the outcome as an opportunity for innovation, creativity that has the potential to transform into true competitive advantage. This should be a skill that will allow all procurement functions to excel and inspire new approaches where developed and mature functions especially need to take a different approach to what has preceded iteratively before. This will lead to more effective decision making, which can be evidenced as well as creating new ways of working.

This knowledge paper intentionally addresses the shift from a theoretical framework to one that has a very practical application ² and natural fit with the discipline of procurement.

² Duron, R., Limbach, B. & Waugh, W. (2006). Critical Thinking Framework for any Discipline. International Journal of Teaching and Learning in Higher Education, 17(2), 160-166.

Critical thinking by its nature is self-guided, self-disciplined thinking which attempts to reason at the highest level.

In essence the risks are not giving ourselves the time and to evaluate a category of spend or an opportunity from all the different perspectives we can. Remember as a procurement professional we may choose to look at the savings opportunity as an over simplified perspective, but clearly someone from marketing, data security, data protection, legal and so forth will all have valid but different views of the same opportunity or category of spend. It is this richness and diversity of thought that we are seeking to develop or achieve in critical thinking.

Bloom's taxonomy and a model for Procurement

The proposed framework and process of critical thinking development utilises the 21 Century Bloom's Taxonomy model (Bloom, 1971 and 1974). The model has been adopted and modified appropriately to guide students' work via six stages of critical thinking process:

- Stage 1: Remembering;
- Stage 2: Understanding;
- Stage 3: Applying;
- Stage 4: Analysing;
- Stage 5: Evaluating; and
- Stage 6: Creating

(Anderson & Krathwohl, 2001). The paper also argues that the delivery of Bloom's taxonomy-based thinking and analysis process in a business context will enable an individuals critical thinking.

The seminal work of Benjamin Bloom established a framework for categorising critical thinking (of educational goals and objectives) into a hierarchical framework based on a level of critical thinking. The author developed the so called Bloom's Taxonomy model (Bloom et al., 1956) consisting of six levels of difficulty and complexity of intellectual or cognitive skills as presented in Figure 2 below.

LEARNING DOMAINS	DESCRIPTION
1. Knowledge	The remembering of previously learned material; this involves the recall of a wide range of material, from specific facts to complete theories.
2. Comprehension	The ability to grasp the meaning of previously-learned material; this may be demonstrated by translating material from one form to another, interpreting material (explaining or summarizing), or by predicting consequences or effects.
3. Application	The ability to use learned material in new and concrete situations; this may include the application of rules, methods, concepts, principles, laws, and theories.
4. Analysis	The ability to break down material into its component parts so that its organizational structure may be understood; this may include the identification of the parts, analysis of the relationships between parts, and recognition of the organizational principles involved.
5. Synthesis	The ability to put parts together to form a new whole; this may involve the production of a unique communication (thesis or speech), a plan of operations (research proposal), or abstract relations (scheme for classifying information).
6. Evaluation	The ability to judge the value of material for a given purpose; The judgments are to be based on definite internal and/or external criteria.

Source: Bloom et al. *Taxonomy of Educational Objectives*, 1956.

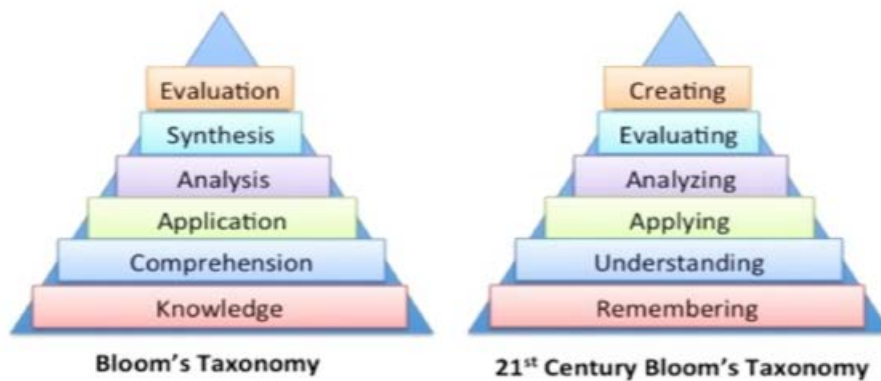
Figure 2: The Cognitive Domain and the Development of Critical Thinking Skills

In this hierarchical framework each stage of learning is a prerequisite for the next stage and, therefore, mastery of a given stage of learning requires mastery of the previous stage. According to Figure 2, Bloom

identified six levels of cognitive learning arranged from lower-order to higher-order of the learning domain, moving from the simplest to the most complex in an in-depth coverage of each category: knowledge, comprehension, application, analysis, synthesis, and evaluation. This process determines that individuals must master all steps in its recommended order to develop and master critical thinking skills. Later, the research on critical thinking began to be progressed to augment this to set out the following from a scholastic perspective;

1. **Knowledge:** The remembering of previously learned material; this involves the recall of a wide range of material, from specific facts to complete theories.
2. **Comprehension:** The ability to grasp the meaning of previously learned material; this may be demonstrated by translating material from one form to another, interpreting material (explaining or summarising), or by predicting consequences or effects.
3. **Application:** The ability to use learned material in new and concrete situations; this may include the application of rules, methods, concepts, principles, laws, and theories.
4. **Analysis:** The ability to break down material into its component parts so that its organisational structure may be understood; this may include the identification of the parts, analysis of the relationships between parts, and recognition of the organisational principles involved.
5. **Synthesis:** The ability to put parts together to form a new whole; this may involve the production of a unique communication (thesis or speech), a plan of operations (research proposal), or abstract relations (scheme for classifying information).
6. **Evaluation:** The ability to judge the value of material for a given purpose;

Eventually, several models of critical thinking provided explanation and validation of the stages of inquiry developed by Bloom that are necessary to develop critical reasoning skills. Further, Anderson and Krathwohl (2001) revised the Bloom's Taxonomy framework where Knowledge was replaced by Remembering, Synthesis by Evaluating, and Evaluation by Creating, as set out in Figure 2. Therefore a 21st Century version was adopted and is now more commonly used as a taxonomy for use in business, see figure 3 below.



Source: Anderson and Krathwohl (2001).

Figure 3: Bloom Taxonomy Model and 21 Century Bloom's Revised Taxonomy Framework

Taking this into an organisational environment others have chosen to represent this in other ways to reflect the way it needs to be used and implemented to have meaning and context. One such organisation is the Management Department at the United States Coast Guard Association (USCGA), see Figure 4 below.



Source: Department of Management, U.S. Coast Guard Academy

Figure 4: Critical Thinking Skills Process from First-year Level to Senior Level

The Watson-Glaser Critical Thinking Skill

As contrast to Blooms taxonomy it is important to realise that there are other researchers and academics who have developed other models and processes/approaches. One of these was Edward Glaser. He developed and defined a critical thinking ability in 1941, that considers the following approach;

1. a wise attitude in considering problems;
2. knowledge of logical investigation;
3. skills in applying the methods of critical thinking. Watson-Glaser provides the view that critical thinking is a skill set that strongly underlies individuals' success in learning.

For several years, Watson-Glaser has researched and developed critical thinking skills. This development is based on encouragement in combining the attitudes, knowledge and skills that are formed from critical thinking skills. The steps Watson-Glaser examine how students with critical thinking when they solve a problem are described as follows:

1. Inference making: The ability to distinguish between true or false conclusions from the data given
2. Recognition of Assumptions: The ability to recognise an assumption of a statement given orally or written.
3. Deduction: The ability in determining a decision on the conclusion that must be followed from the provided information.
4. Interpretation (induction): The ability to consider and decide whether the evidence and conclusions obtained can be generalised.
5. Evaluation of arguments: The ability of to give more appropriate and relevant arguments through specific questions of the given problem.

The steps above are a tool developed by Watson-Glaser that can be used widely in measuring and assessing individuals' critical thinking skills in application. This instrument is considered to be a tool in assessing success to improve critical thinking skills. After 85 years of development of Watson-Glaser's work with the trust of several educational institutions and companies, Watson-Glaser introduced a change in their work namely Watson-Glaser II. They transformed the five structures into three inseparable structures without reducing the essence of need in the goal of critical thinking ability. Inference, deduction and interpretation that are interconnected and can be contained and associated with the withdrawal of conclusion (draw conclusions).

While recognition, assumptions and evaluation of arguments are as an independent factor. The model proposed is outlined in figure 5 below;



From the new RED model, the author tries to develop several indicators of the RED Watson-Glatser above that have been modified from several research sources. The development of RED Watson-Glatser critical thinking ability indicator can be seen in the table below:

Figure 5: RED Watson Glaser model.

The development of the RED model and the following indicators is expected to assist in measuring and developing the critical thinking skills of individuals and groups. The final goals of the ability are to improve professionalism and to perform as well as possible the individuals' learning both in their environment or outside of the work environment or learning/development. The indicators Glaser referred to in his work are set out in Figure 6 below;

Critical Thinking Skill	Sub-Critical Thinking	Description
Recognise Assumptions	Recognise (assumptions)	Giving comments with the correct information
		Responding and questioning an assumption
		Collecting keys or problems as the further information
		Information and facts about the problem
		The ideas or assumptions that support the strategy or plan
		Is there strong evidence to support the given assumptions
Evaluate Objective Arguments	Analysing Arguments	What are the ideas you can explore
		What to know for the next plan
		Analysing of arguments to evaluate, analyse information objectively and accurately
		Questioning the quality of supporting evidence
		Being objective to sort through the validity in drawing more accurate conclusions
		Identifying each argument as strong or weak
	Deduction	Identifying relevance and irrelevance
		Looking for similarities and differences
		Identifying conclusions
		Giving information through a list of decision-making
		Whether the certain conclusions should follow the information in the given report
		Defining the problem
		Selecting criteria to create a solution
		Formulating the possible alternatives

Draw Conclusion		Deciding what to do tentatively
		Reviewing
	Information	What information still needs to be added
		The results of the investigation which become as specific findings
		Interpreting the information found to draw a conclusion
		Analysing how it will be done
		How to interpret it
		The reason to think that it is the right answer or the accurate solution
	Conclusion (inference)	Giving the best judgment with quality decisions
		After evaluating all of the facts, what are the possible conclusions
		The evidence that leads to a conclusion
		Is there any new evidence that will impact a decision
		What are the conclusions that can be drawn?
		The decision must be based on the given information
		Making generalisations
		Making conclusions and hypotheses
		Interpretation of the statement

Putting critical thinking skills into a procurement context

Any critical thinking approach as a formal exercise must be designed on a step-based critical thinking process. Therefore, becoming increasingly complex in content by actively and sequentially addressing each of the components adopted from the 21 Century Bloom's taxonomy of higher-order thinking skills.

Having a clear purpose, scope and set of deliverables will be key to ensuring the structured and disciplined approach necessary.

Using the example below of a category of spend such as an indirect category it will show how this might manifest itself in a real world application at a high level.

CRITICAL THINKING STAGE	FOUNDATION LEVEL	MANAGERIAL LEVEL	LEADERSHIP LEVEL	OBSERVATIONS
STAGE 1: REMEMBERING	List current situation	Ensure benchmarks are in place and agreed across the organisation	What is the weighting of the decision making criteria?	Think wider than just the immediate stakeholder group
	List special criteria relevant to the category	What is the decision making criteria?	Prior business cases	
	What are the financial attributes: margin, overhead contribution, tariffs, taxes, etc.?	Non-monetary value adding attributes	Lessons learnt from similar or parallel categories	
			Linkages to vision, strategy and key/senior	

	personal objectives			
STAGE 2: UNDERSTANDING	Develop a clear understanding of the potential suppliers and service providers from publicly available sources	Explore insight from non-direct sources of media, networking information and intelligence about potential vendors and/or service providers Current and future trading opportunities and risks for the sector	Explore insight from non-direct sources of media, networking information and intelligence about potential vendors and/or service providers Current trading and market dynamics of feeder markets and influencing economic factors	What is considered of value and highly prized by the immediate vendor/service provider and immediate tiers of the supply chain
STAGE 3: APPLYING	What are potential nontangible factors that may influence the outcome	List the qualitative factors that could influence the outcome when proposed as a formal sign off or decision	Explore and evaluate the quantum of each factor from the qualitative factors. Evaluate and understand the heuristics and biases of the key decision makers that may have an influence on the decision making	Developing a sense of the behavioural attributes of senior decision makers which may well be critical at this stage
STAGE 4: ANALYSING	What activities or areas may be impacted such as revenues, costs, lead times, cash flow, etc. as a decision being considered	Is this an opportunity to insource or outsource activity Further, could this supply or activity be phased out or substituted Ensure there is alignment on terminology, financial assessments and evaluations What are the typical risks applicable to the category and the respective mitigations?	What applications in parallel industries may have applicability in the context of the supply or service being considered? Are there any potential "Black Swan Events" to be acknowledged	Make sense of the current trends and translate them into something applicable to the category under consideration

STAGE 5: EVALUATING

Document all the considerations both for and against the proposed decision, including non-quantitative factors

Verify and conform how you will present financial and non-financial data and benchmarks

How can this align with the way the business presents its data and information so that it is synonymous with the business approach

Keep things in the language of the business not procurement speak!

STAGE 6: CREATING

What will the new order or change of vendor or service provider impact both directly and indirectly

What alignment and adjustment will be needed outside the areas of direct impact?

Stand back and look at this from the perspective of every department in the organisation

The above is a very simplistic set of considerations, however, the more iterations and challenges you place on your factors under consideration the better. The outcome may be the same supplier/vendor in the same arrangements but that will be the exception rather than the normal outcome having applied yourself to a critical thinking approach if done correctly.

Applicability

As procurement professionals, contract managers or supplier relationship managers, we all have expectations and are driven by outcomes (usually tangible ones).

As you will see the segmentation from a people perspective, but also a critical thinking lens can be considered as an overlay to the known approaches in procurement, further it brings into play not just the people skills (soft skills - the subject of another knowledge paper) but also the critical thinking skills.

The applications in an organisation are far and wide and can be applied at the category level to much wider and larger scale issues, such as outsourcing, insourcing, innovation allied to new products, supply chain reviews, value chain management through multiple tiers of supply as some real examples.

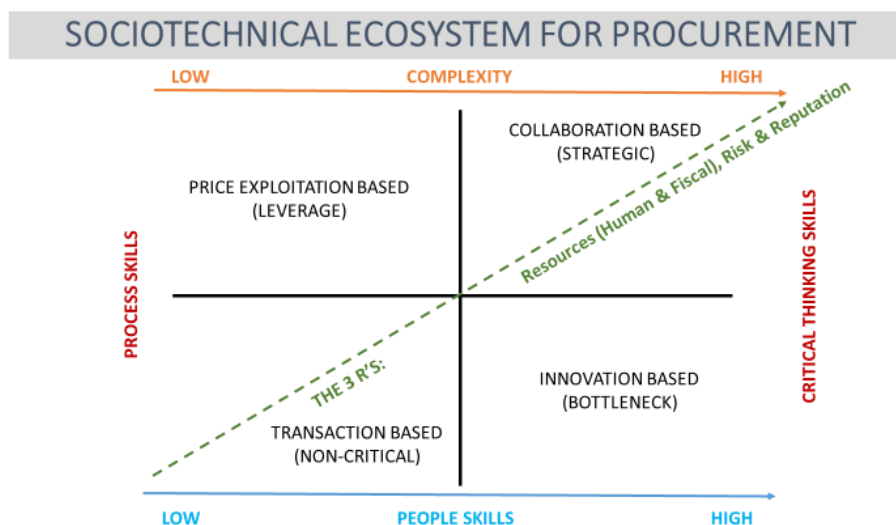


Figure 3: Sociotechnical ecosystem for Procurement (Loseby 2018)

To reiterate a key perspective from the soft skills knowledge paper, it should be recognised that each individual given the unique nature of their lifetime experiences, training, skills, etc. at a very simplistic level will inevitably view each situation and decision differently. Looking closely at the factors that create to this difference in us, I refer to what is known as “heuristics and biases” as defined in more detail below. This links with earlier observations as to why two people or groups may not necessarily evaluate or view a situation the same.

- Heuristics can generally be taken, in psychology terms, as simple, efficient rules by which people often use to form judgments and make decisions. They are mental shortcuts that usually involve focusing on one aspect of a complex problem and inherently ignore others.
- Biases can be said to be the influencing factors or prejudices based on known limits of knowledge, experience, etc. This also extends in economic terms to hindsight, status quo (keeping), bold and conservative forecasts, etc.

Summary

In summary I will leave you with these final thoughts as considerations about competencies outside of the technical toolbox for practitioners to reflect upon:

- Making sense of big data requires critical thinking skills
- AI and automation will only take us so far, but will be followed by critical thinking
- Doing the same as before will not augment the profession or your standing within it!
- CEO's and other senior stakeholders see procurement as a blocker to innovation: Critical thinking skills will reverse this perception.

The ten critical job skills of the future, according to McKinsey's global chief learning officer in September 2017. According to Nick van Dam, global chief learning officer at McKinsey & Co., the rapid advancement (of the fourth industrial revolution, as a coming wave of disruptive technology in fields like artificial intelligence, machine learning, the mobile internet) will lead to massive job losses, as entire industries and companies and the workers they employ cease to exist. Further, while digital competencies will be the foundation upon which the job skills of the future are based, technological know-how will not be enough to compete effectively.

Citing World Economic Forum research, van Dam said the Top 10 skills that will be in demand in the near future are:

- Complex problem-solving
- **Critical thinking**
- Creativity
- **People management**
- **Coordinating with others**
- **Emotional intelligence**
- **Judgment and decision-making**

- Service orientation
- Negotiation
- **Cognitive flexibility**

“It’s all about how we can do things differently,” van Dam said. “How can we come up with new products and business models and use technology to work smarter? It’s all about ideation, and ideation is driven by creativity.”

In short critical thinking skills are a critical and essential part of the (many) competencies that are necessary to become a true procurement professional.

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Further Reading

For further reading on this subject the CIPS recommended publication by the author is now available, along with other journal publications available in the public domain:

Soft skills for Hard Business: Loseby, D. L, Cambridge Academic Publishers, 2018, ISBN: 1903-499-93-3

Developing and Assessing Critical Thinking skills – The International baccalaureate Project 2014 : Final Report parts 1 & 2: Swartz, r. & McGuiness, C.

Cultivating Critical-Thinking Dispositions Throughout the Business Curriculum: Bloch, J. & Spataro, E. S. Business and Professional Communication Quarterly 2014, Vol. 77(3) 249–265
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