



**HAL**  
open science

## Creative Tools and Processes to Remain Competitive in the Twenty-First Century

Mario Dubois, Loic Hamel, Mickaël Gardoni

► **To cite this version:**

Mario Dubois, Loic Hamel, Mickaël Gardoni. Creative Tools and Processes to Remain Competitive in the Twenty-First Century. 9th International Conference on Product Lifecycle Management (PLM), Jul 2012, Montreal, QC, Canada. pp.332-338, 10.1007/978-3-642-35758-9\_29 . hal-01526141

**HAL Id: hal-01526141**

**<https://inria.hal.science/hal-01526141>**

Submitted on 22 May 2017

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

# **Creative tools and processes to remain competitive in the twenty-first century**

Mario Dubois, Loic Hamel, Mickael Gardoni

École de Technologie Supérieure, Engineering Automate Production Dept., Montreal,  
Qc, Canada, H3C 1K3

## **Abstract**

Remaining competitive in the twenty-first century in the world market is more and more difficult. Trying to keep a place in the market on cost and quality alone is not a valid strategy any more: others can do the same product just as well and at a competitive cost. Could teams and larger groups in organizations be more creative using them? This paper describes an experiment done with 300 university and engineering students from around the world during an event named “The 24 hours of innovation” held in 2011. Student teams had to find creative solutions to problems submitted by manufacturing companies in consecutive 24 hours. Results obtained show that many teams using appropriate creativity processes and techniques have well performed in that competition, helping them to create solutions to industrial problems submitted. Those findings could be applied to real organizations facing similar challenge to innovate.

Keywords: Creativity, tools, process, innovation, competitiveness

## **1 Introduction**

In this paper, we discuss about the opportunities that creative processes and tools could bring to companies in order to remain competitive in the twenty-first century. Those tools could help them to find ideas to create products and services for the demanding

marketplace. [7] argued that “companies can no longer compete on cost and quality alone because others can produce the same product just as well and at a competitive cost; as a consequence, imagination and innovation have taken on much greater import in sustaining a competitive edge.”

For [10], “the creative process or creative thinking is the psychological means whereby such novelty is brought about”. So, to be creative, thought and psychology means are important. The creative process and, consequently, the creative thought take their roots in the psychology instead of logical means.

Creative tools, on their side, were made to help us to be more creative. For [1], “the main enemies of creativity are tunnel vision and lack of inspiration. Either we know too much about the past to do anything but continue trudging down the same path, or we haven’t got the vision to see a new destination.” As [1] explained, “the idea of a creativity technique [is] to get a different viewpoint, by forcing you to do something you wouldn’t normally do. This can be uncomfortable, but it is the only way to make something happen.”

Doing a survey of existing creative tools, we have found more than 500 hundreds creative tools available worldwide. Could teams and groups in organizations be more creative using creative processes and tools? This paper describes an experiment done with 300 university students around the world during an event named “The 24 hours of innovation” held in 2011.

## **2 Lone creators and groups**

For [2], “lone creators appear increasingly anachronistic, as teams and larger groups in organizations become the dominant mode through which progress is made in much of the world.”

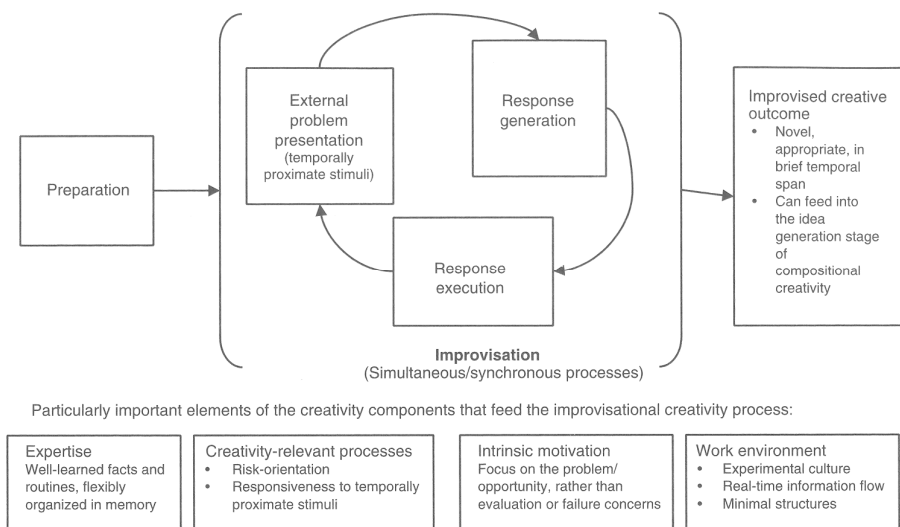
[7] describe how those large groups work to maintain a high level in the competition. For them, world economic pressure raise constantly on companies. They have to find ways to stay competitive. They have to bring new products and services on the market knowing that their survival is related to their abilities to do so.

## **3 New products and services needed**

Havard Business Review Analytic Services [3] have conducted a survey of 1,214 business executives from around the world. The survey found that companies seeking growth must bring new products and services to the market. While the demand for new products, services and revenues going with them is high, the risk of failed experimentations must be weighed against the actual state of the economy. The innovation process involved to do new products and services development involve more people than before from ideation beyond products and services retirement. Partners bring new ideas and innovation possibilities and, on the other side, increased concerns regarding intellectual property rights.

To innovate, we need good ideas, since idea generation is one of the first steps of many innovation processes. But how do we get them? Innovative process can help to do innovation faster, at a better cost [9]. To create, we could also use creative process.

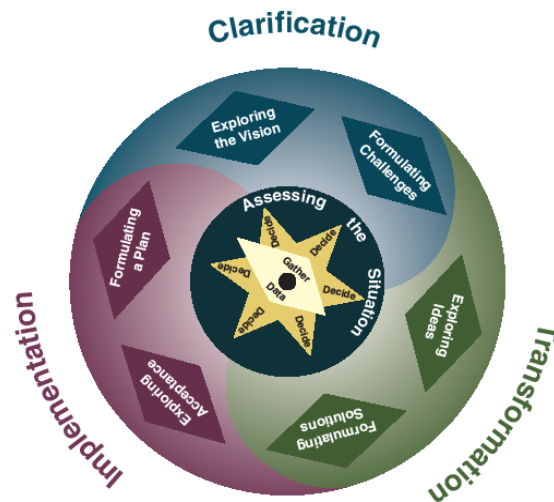
[2] have proposed a model of improvisational creativity on organizations. Their model differ from other traditional models of compositional creativity on two distinguishing features: “preparation precedes the improvisational process, and the stages are ‘fluid’, with problem presentation, response generation, and response execution happening virtually simultaneously.” [2]



**Fig. 1.** Proposed models of improvisational creativity on organizations by [2]

To produce new and creative ideas, [8] have created a version of the Creative Problem Solving (CPS) process named “Thinking skills model”. The CPS process was originally created by [6] in 1953.

It is a process used for situations that require a change, a new way to think or a new approach. The creative thinking associated to the CPS process is suited to resolve complex problems such as those involving ambiguous, not well defined, changing and new situations.



**Fig. 2.** CPS Thinking Skills Model of [8]

#### 4 Creative methodologies and the Lean system

For Toyota, problem solving and continuous improvement are major principles of their manufacturing philosophy, which influenced many companies around the world. Several creative tools are integrated in the lean system. As an example, “The five whys” is a creative tool used to do problem solving in the lean system. For [5],

*By asking why five times and answering each time, the real cause of a problem can be discovered. Often root causes are hidden under more obvious symptoms, and only by unpeeling the layers of the problem can the root be found. [...] Repeatedly asking why is the scientific basis of the Toyota system.*

The Brainstorming technique created by [6] in 1946 is used when doing Kaizen, one of the tool part of the Lean system [4]. Many Checklists and matrix tools are use with the Kaizen tool: there is an opportunity to add creative tools to enrich this tool. Creative Problem Solving could also be used in conjunction with problem solving techniques used in Lean system.

## 5 The 24 hours of innovation

We've asked to 300 university students (mostly undergraduate and graduate engineering students) coming from 12 universities of North and South America, Europe and Africa and from a technical college from Reunion Island to participate in a study to find if creative tools and processes may help teams in their ideation process. Students have worked on 11 different sites around the world.

Teams could choose to use (or not) creative tools and processes specially chosen for the 4<sup>th</sup> international edition of "The 24 hours of innovation"<sup>1</sup>, organized by "École de technologie supérieure (ÉTS) de Montréal", held from November 23<sup>rd</sup> to 24<sup>th</sup> 2011.

The event is a 24 hours creativity challenge asking participants to find a creative solution to a technical problem brought by industrials and university searchers.

In this event, as per rules created by ESTIA<sup>2</sup>, teams are created by the students. Problem submitted could be chosen by one or many teams depending of the choices they made. All the sites are connected to a Web network allowing them to interact with each site. At the end of the event, they have to upload on YouTube™ a three minutes video presentation of their solution. A local committee chose the best projects and sends the winner project to an international committee who will choose the three best international projects from all the local winning projects. Money prizes are given to the winners. The solution is in many cases, an idea of how to solve the technical problem, 2D or 3D drawings of that solution and in some case, with a 3D simulation.

---

<sup>1</sup> The 24 hours of innovation is a trademark event created by "l'École Supérieure des Technologies Industrielles Avancées" (ESTIA) de Bidart en France.

<sup>2</sup> ESTIA mean "l'École Supérieure des Technologies Industrielles Avancées". The rules that regulate a 24 hours of innovation are described on their website at the following address : [http://www.24h.estia.fr/?page\\_id=17](http://www.24h.estia.fr/?page_id=17)

## **6 Study done during the event**

Before the beginning of the event, we've sent to all participants, e-mails proposing them to collaborate to this study. They were informed of the advantages to use creative processes and tools. A Website describing two creative processes, creative tools plus articles of recent technical innovations, was used to instruct them on how to use those creative processes and tools (<http://etsinnovation.wordpress.com>).

Having a searcher at two event sites, we have been able to follow the work of 7 teams: four teams localized at "Université de technologie de Belfort-Montbéliard" (UTBM), Belfort, France, two teams at Quebec city, Quebec, Canada and one "mix" team with participants at each place. Two teams had 7 members; two others, 8 members and the last three had 10 members in each team (60 participants in total). We were able to offered to those 7 teams before and during the event, mentoring and coaching on the two creative processes chosen, the CPS thinking skills model (identified as CPS) and the models of improvisational creativity on organizations (identified CIO) for which we have integrated creativity tools for each process step. Two teams have chosen to work with the CPS process, two others, the CIO process, one with different process and tools (TRIZ and C-K), and the two last chose not to use any creative process.

We had an online survey for all the other teams. Participants were asked to answer questions relating to their creative works done every two hours. Our hypothesis for this study was: Teams who used creative process and creative tools would have a better ranking at the end of the event than teams who didn't use any process.



## 7 The results

Analyzing the data obtained from the online survey told us what we've observed: since this event is based on speed and team performance, we were able to collect data from those teams but with too many inconsistencies. On the other end, the data collected by our two searchers who followed the 7 teams were good. The ranking obtained by the 7 teams was the following:

**Table 1.** Final ranking of 7 teams during the event "The 24 hours of innovation"

TEAMS	LOCALIZATION	PROCESSES	LOCAL RANK
1	UTBM + Quebec	CPS	1
2	UTBM	CPS	5
3	UTBM	CIO	2
4	UTBM	CIO	4
5	Québec	TRIZ, C-K	2
6	UTBM	None	3
7	Quebec	None	3

For the teams who used the CPS process, the team from UTBM and Quebec City finished first in the local ranking (and second in the international ranking). The second team, who used the CPS process at UTBM, finished at the fifth and last place. The two teams from UTBM who used CIO process finish second and fourth. The last team who used a creative process (TRIZ) finished second at Quebec City. The two other teams who didn't used creative processes and tools, finished third at UTBM and third (last) at Quebec City. The local ranking mean value for the 5 teams who use creative processes and tools is 2,8 and 3,0 for the two teams without creative processes and tools.

## **8 Conclusion**

Teams who used creative processes and tools have appreciated the “structure” those creative processes and tools gave them during that event. They knew what they had to do and what was still to come, giving them the chance to balance their work for the time allowed. Creative tools help them generate ideas (diverge) and choose ideas (converge) when it was the time to do so. Doing it again, they would use again to work with creative tools and process.

We had not enough data collected to get an answer for the hypothesis made. Collecting data, we found qualitative parameters that we didn't took in account with, probably, significant impact on the ideation work: quality of the teamwork's done, kind of leadership in place in the team, knowledge of each other in the team and the creative ability of each team member. Those qualitative parameters may influence the participation, the work done and, consequently, the quality of the problem's solution presented.

## **9 Future work**

We will hold the 5<sup>th</sup> edition of “The 24 hours of innovation” on may 23<sup>rd</sup> and 24<sup>th</sup> 2012, planning to have for this edition, 1000 participants<sup>3</sup>. We will do the study again adding data on those new qualitative parameters and on the number of divergent and convergent ideas found for each creative process step. We also want to know how much time they worked on each creative process steps.

---

<sup>3</sup> For more informations, consult the following Web site : <http://24heuresinnovationets.wordpress.com/>

## References

1. Clegg, B., Birch, P.; Instant creativity: Simple techniques to ignite innovation and problem solving. Kogan Page Publishers (2007)
2. Fisher, C.M., Amabile, T.; Creativity, improvisation and organization. In Rickards, T., Runco, M.A., Moger, S. (eds.) The Routledge companion to creativity, pp. XXX Routledge, New York (2009)
3. HBRAS; Closing the gap: How companies achieve smarter new product development and make better decisions with technology. Harvard Business Review, June, 1-20. (2011)
4. Mika, G.; Kaizen: Event Implementation Manual, 5<sup>th</sup> edition. Society of Manufacturing Engineers (SME), Michigan (2006)
5. Ōno, T.; Toyota production system: beyond large-scale production. Productivity Press, Massachusetts (1988)
6. Osborn, A.E.; Applied imagination: Principles and procedures of creative problem solving. Scribner's Sons, New York (1953)
7. Puccio, G.J., Cabra, J.; Creative problem solving: past, present and future. In Rickards, T., Runco, M.A., Moger, S. (eds.) The Routledge companion to creativity, pp. XXX Routledge, New York (2009)
8. Puccio, G.J., Murdoch, M.C., Mance, M.; Creative leadership: Skills that drive change. Sage, California (2007)
9. Rothwell, R.; Towards the Fifth-generation Innovation Process. International Marketing Review, 11, 1, 7-31 (1994)
10. Weisberg, R.W.; Creativity: understanding innovation in problem solving, science, invention, and the arts. John Wiley and Sons, New Jersey (2006)