CREATIVE TEAMWORK IN QUICK PROJECTS DEVELOPMENT QPD, 24 HOURS OF INNOVATION

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ABSTRACT
In this paper, we are interested in the analysis of the creative activity of Charrettes for innovation in product design. The charette is "an intensive, concentrated and deadline oriented group confrontation and discussion technique" [1]. There are some questions about this activity of Quick Projects Development QPD. We consider that our research could clarify four discussion topics regarding creative teamwork in the particular context of a charrette: a) team building and the idea development, b) an analysis of the issues presented in the innovative projects and the response of the team, as well as, c) the use of time in work sessions and d) the role of the leader in the team creative performance. These answers are important for the planning of teamwork in the QPD activities of technological projects. This empirical study was carried out within the context of the Fourth Edition of the 24 Hours (24H) of Innovation international competition, organized by the École Supérieure des Technologies Industrielles Avancées (ESTIA, France), with the participation of almost 250 university students coming from 25 different universities and in partnership with more than 30 industrial enterprises.

Keywords: Quick projects development (QPD), charrettes, creative work, collaboration in design, designing for innovation

1 INTRODUCTION
The charette is "an intensive, concentrated and deadline oriented group confrontation and discussion technique applied to identify, analyze, evaluate and solve educational, organizational and community problems and needs"[1]. The charrette is used like an educational activity[2], but time constrains of the teams of R&D development or decisional teams makes that the charrette could be an effective design technique. One other aspect of the charrete is the "creative burst of energy that builds momentum for a project and sets it on a course to meet project goals" [3]. We questioned if this quick projects development (QPD) technique should be effective in terms of creativity thinking or creativity performance. Lindsey et al. [3] also mention that the charrette could "transform a project from a static, complex problem to a successful, buildable plan" (Ibid). Usually, it is an intensely focused, multiday session that uses a collaborative approach to create realistic and achievable designs that work. Other important aspect of the charrette is the benefits to facilitate the "interaction and feedback mechanism between industry respondents and academia" [4]. Also, the charrette is used by "researchers to gather data relatively quickly, collect valuable input from experienced practitioners, make excellent industry contacts, and gain insights with several collection strategies"[4].
Annually, our research team promotes 24 Hours of Innovation (24H) is an international competition created by the École Supérieure des Technologies Industrielles Avancées (ESTIA, France) with the purpose of developing innovative solutions.
Our research interest in team creative performance of QPD, is driven by the possibilities that the answers could impact the industrial projects development. As we know, the industrial enterprise imposes strict time constraints on its product development teams in order to reduce costs of research and development R&D. For this reason, the creative stage of design definition is crucial for the overall performances of the product. The initial ideas presented by the teams in charge of conceptualizing the product, generate a "path dependency" into the entire project development, and also create a "snowball" effect in the following stages of production: changes made during the first stage of the project are less costly to bring about the changes made during the final stages of production [5].
On the other hand, company teams are formed within an interdisciplinary context. In other words, employees are not grouped together according to their creativity, instead according to their professional competence (domain-skills) [6]; in this way, comprising different levels of experience.

Also, expert members could work with the novice members. Hoegl and Parboteeah [7] claim that experience and shared abilities allow for a team to be more efficient in completing tasks, but not necessarily in the effectiveness nor quality of their creative solutions [8].

2 DESCRIPTION OF 24H – INTERNATIONAL COMPETITION

The competition is set in the time frame of 24 consecutive hours and crafted to address students from a variety of engineering disciplines, as well as universities. Last year, the Fourth competition took place in Bidart-France, during October 22 and 23, 2010. The teams were challenged to come up with an innovative solution to a problem presented at the beginning of the event[1], and then assessed by the academics and manufacturers. In this Fourth edition of 24H, about 250 students attended divided in 27 teams made of 1 to 11 members. This 24H edition, 34 project definitions were proposed to the teams. Each team freely selected the topic of its work, in accord to its members' experience, knowledge or project interest.

24H represents a student competition that involves organizational team strategies and creative collaboration. The organization of teamwork during the execution of short term innovative projects poses numerous questions[9], specially:

1. What is the influence of the interdisciplinary grouping of teams? Is there some special influence of the team composition by gender, or by field of study (industrial, construction, physical, informatics, ergonomics, computer, consulting, management, and logistics)?
2. How to assess demands posed on the teams in function of their experience?
3. How the teams are influenced of the prior knowledge of the members?
4. Is there any importance of the number of ideas produced and the time taken of the selection of ideas?
5. Does the leader have a role in the creative teamwork performance?

In the scope of work carried out by the 27 teams in the competition *24H*, we analyzed four variables linked to the activities in the development of creative teamwork in QPD: a) the interdisciplinary grouping of teams, b) the assessment of the task demand (projects proposal) posed on the teams, c) the influence of experience and prior knowledge, on the number of ideas produced and the selection of ideas into the time assigned and, d) the composition of team in relation with the leader influence.

3 METHODOLOGICAL PLAN

After the implementation of the experimental protocol made during the contest *24H* Edition of Montreal[9], our research group decided to conduct an empirical study of creative teams in the Fourth Edition of Bidart. Contrasting our initial experimental protocol elaborated for 3 or 4 members, Bidart's teams have a number of 1 to 11 members. So we decided to carry out an investigation in accordance with this variable and to add another variable: the analysis of the influence of the leader in the performance of the group. The hypothesis was that in the large teams the creative teamwork performance is well defined by the leader performance.

3.1 Subjects

After an invitation was sent out by the organizational committee of 24H, almost 200 students registered and attended the local competition and 42 students worked at remote way with videoconference from Grenoble (France), Bath, Wolverhampton (UK), and Montréal (Canada). During the 24H, the constitution of groups is free. Often, students accustomed to working together, placed themselves in the same team, (most of them were in pairs with 2 years experience of working group). Others participants choose first of all, the topic or one specific project owner and constitute after randomly the team with others members according to their order of registration. In Table 1, we get a glimpse of how the teams were formed: number, domain of work and institution. Following the jury's assessment, the first 10 teams were placed in the same order obtained at the end of the competition. The teams with an outstanding creative performance were placed from T1 to T12 and the teams without a mention from T13 to T27.

[1] For more details, please see: http://www.24h.estia.fr/index.php?lang=en

Table 1. Team composition by number of participants, time of knowing each others, discipline and school

Team	n	Domain	School	Time of grouping	Award
T1	10	Mechanical, Electronics, Software, CAD	ESTIA (9), ECE Paris (1) **Fr**	+2 years	1st Prize
T2	10	Mechanical, Software, Design	ESTIA (8), Ec. Boole/Cachan (1), Nursing (1) **Fr**	+2 years	2nd Prize
T3	10	Engineering, Business	Mondragon Univ. (8) **Sp**, ESTIA **Fr** (2)	+2 years	3rd Prize
T4	10	Enterprises-Leadership	Jyväskylä Univ **Fi**. (8) Mondragon Univ **Sp**, (2)	-1 year	Best Breakthrough
T5	10	Enterprises-Leadership-*Innovation*	Mondragon Univ. **Sp** (10)	-1 year	Best Marketing
T6	10	Engineering 1st year & 2nd year Mechanical, Electronics, Software, CAD	ESTIA **Fr** (10)	+2 years	Best Virtual Animation
T7	10	Communication, Materials, Engineering	ESTIA (5), Biology (1), Ec. Mines (4) **Fr**	+2 years	Best Prototype
T8	6	Engineering 1st year	ESTIA **Fr** (6)	-1 year	Environment
T9	10	Engineering, Sport	ESTIA (5), IFMA (4), Sport (1) **Fr**	-1 year	Best Invention
T10	10	Engineering	Unemployed Engineer **Fr**	Alone	Perseverance
T11	5 (5)	no data available (videoconference)	Wolverhampton Univ. **UK**		Best Design
T12	10	Engineering, Anatomy	ESTIA (2), Ec. Mines (6), Sport (2), **Fr**	-1 year	Best Video
T13	10	Mechanical, Biology	UTC (5), ESTIA (4), UTBM (1), **Fr**	-1 year	
T14	10	Economics, Finance, Engineering	ESTIA (2) **Fr**, Mondragon Univ. **Sp**, (8)	-1 year	
T15	8	Electronis, Mechanical, Ergonomics	ESTIA (3), ENIT (2) UDS (3) **Fr**	-1 year	
T16	7	Engineering 1st year	ESTIA (7) **Fr**	-1 year	
T17	10 (5)	Mechanical, Design (videoconference)	EILCO (5) **Fr**, Bath Univ. (5) **UK**	(5) +2 years	
T18	6	Aeronautics, Ind, Commerce	ESTIA (3). Ec. Mines (1) Consulting (1) **Fr** Ec. Commerce (1) **Sp**	0 years	
T19	7	Industrial maintenance	Univ. Paris 8 (7) **Fr**	+2 years	
T20	3	Inform, Mec-electr	ESTIA (3) **Fr**	+2 years	
T21	10	Engineering 1st year	ESTIA (9), INSA Toulouse (1) **Fr**	-1 year	
T22	10	Industrial Design	Mondragon Univ. (10) , **Sp**	+2 years	
T23	8	Ind. Design, Architecture, Engineering	Mondragon Univ. (8), **Sp**	-1 year	
T24	11 (10)	Mec, Indus, eco-design (videoconference)	INPG (11) **Fr**	-1 year	
T25	10 (9)	Eco-design, Software, Maths (videoconference)	Master GMP (3), INPG (7), **Fr**	-1 year	
T26	9 (8)	Mec, Product, Indus (videoconference)	UJF (3), INPG (6) **Fr**	-1 year	
T27	6 (6)	Engineering (videoconference)	ÉTS (4), Sherbroke University (2) **Ca**	-1 year	

3.2 Task

The competition begins by a 60 minute meeting made for groups to prepare their constitution, and to choose their topic. Demands and constraints of the competition are first presented. Then, alternatives projects – and their issues - were presented to the students during a 20 minute PowerPoint presentation. Thirty four projects were proposed. The remaining 23 consecutive hours are then freely

used by the groups to devise a strategic solution or outline a process for achieving it. At the end of the 24 hours, the teams have 3 minutes to present their solution.

3.3 Procedure

We decided to study the variables of quantity of ideas produced in the 24H term for each team (27 teams in total). Also we classified the team performance according to the general classification – the main "output" obtained for each winning team (10 teams) in function of judges decision (Committee of decision of the contest). We have to highlight that the creativity assessment is a contextual and social assessment[10], for that reason we used at this study the same classification assigned for the final judge results. They classified the teams at the end of the competition, according to the teams' presentation.
Data was collected by interviews done at three moments of the competition and Data on the creative performance of the groups were collected by adapting the experimental plan by Vangundi [11].

Interviews were prepared according to a questionnaire concerning the following subjects:

1. Group composition and grouping characteristics
2. Ideas evolution and team previous experience of work
3. Perceived complexity of the problem
4. Performance of the leader

The main questions were:

1. What was the number of ideas before making the selection of the chosen ideea?
2. When that chosen idea was selected?
3. When the idea was fully defined and what were the following activities?
4. What was the amount of time the group has known each other?

We also asked them about the composition of the team: a) the team and their personal creative characteristics, in particular the leader intervention, as well as, b) the team confidence –how was the work dynamics. The teams also completed a project form that described their activities throughout the 24 hours. During the 24H, each team is asked to fulfill a web tool in order to analyze their activities during the contest (see figure 1):

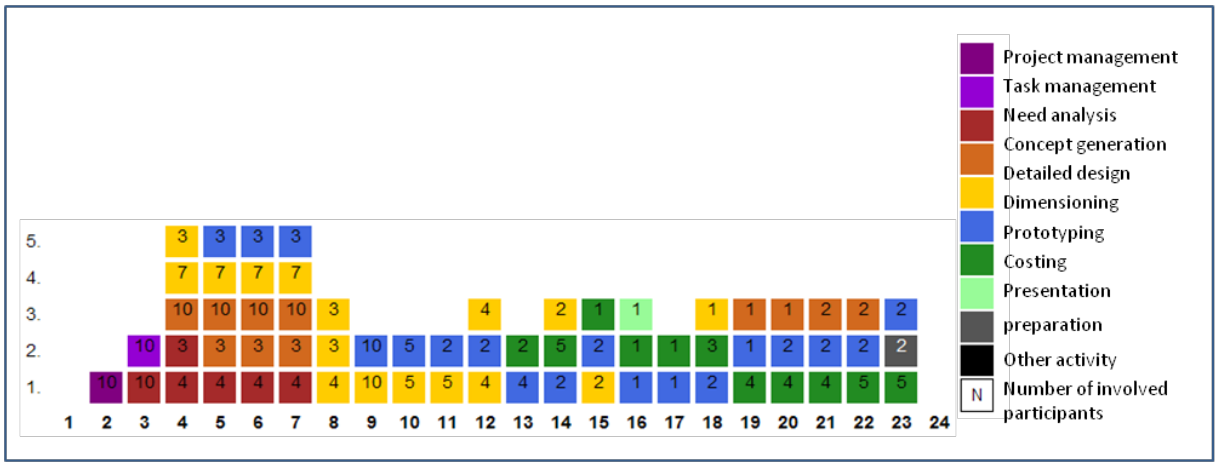

Figure 1. Example of one team activities during the 24 hours

4 DATA ANALYSIS

4.1 Time Required for Team Building and Interdisciplinary Fields

We adapted the VanGundy[11] evaluation of creative performance of team. The assessment consists of a questionnaire about how teams were made up based on 16 personal characteristics: tolerance of ambiguity, ability to work with complex problems, flexibility of thought, capacity to come up with multiple ideas, research of original ideas, level of control over the project, perseverance, self confidence, risk taking, ability to see a problem from different points of view, extraversion, convergent and divergent thought, intuitive and analytic thought, ability to add details or improve on a

proposed idea and interest in aestheticism and the ability for independent thought. VanGundy[11] also suggests teams internal characteristics: 1) same sex, 2) diversity of personality, 3) homogeneousness in creative skills 4) compatibility: when mutual needs are fulfilled 5) ability to work together 6) Vangundy proposed that the required time for team building is two years: less than two years of work experience have a less score, and 7) group size: made up of 3 to 4 members.
We have to remember that the contest had different composition features; the teams were bigger than the number of members proposed by the assessment. Indeed VanGundy [11] proposed a group size of 3 to 4 members, but in the contest, the number of team members were of 9 to 10 (see table 1). For this reason, we adapted the assessment from VanGundy [11] to an evaluation according to five group characteristics, see Table 2.
Each of these characteristic is evaluated by a scoring system from 1 to 5 where 1 represents the absence of the characteristic, and 5 its higher presence. A higher score represents strong compatibility in a creative work team and clarity in reporting the complexity of the initial task assigned to them. In Table 2, we can observe the final results achieved by the teams.
The score inter-domain is high when the team was composed by different disciplines or professions. The item grouping time shows that inside the team there are members who know each other for more than 2 years (VanGundy confers more score if the team have certain maturity). The homogenous item refers to the equal manner of discussing in the process of sharing the ideas given by the teammates. A high score means a good homogeneity in the manner of taking a decision by the team. Personal compatibility is a score proposed for the leader to assess his/her perception of the compatibility between the members of his/her team.

Table 2. Team characteristics adapted of Vangundy's group creative assessment[11]

Scores	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**
Inter-domain	3	4	4	1	2	3	4	2	4
Grouping time	4	4	4	1	4	4	4	3	3
Homogenous	2	4	4	5	2	3	4	2	2
Personal compatibility	5	4	5	4	4	4	4	5	4
Total	**14**	**16**	**17**	**11**	**12**	**14**	**16**	**12**	**13**

4.2 The complexity of the problem perceived by the participants

The perception of the problem's complexity is evaluated through the form "assessing task clarity" [11] **(**p.138). This evaluation allows the team members to estimate, amongst other things: the complexity of the problem by reporting their given efforts, their previous experience in the subject matter, the time needed to develop a solution and the number of procedures or operations required to complete the project. Table 4 presents a general score obtained by each team. Moreover, analyzing the VanGundy[11] results in Table 1 indicates the need to emphasize the efforts on the lowest scores obtained in the assessment of complexity of the creative question.

Table 3. Task complexity adapted of Vangundy's assessment[11]

Scores	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**
Domaine K	4	5	2	4	3	4	4	4	4
Complexity perception	3	2	3	3	3	4	3	3	4
Subjet-K project	4	4	4	1	1	2	2	4	3
Flexibility	4	5	5	1	5	3	4	4	4
Risks	4	1	2	4	2	2	2	2	4
Total	19	17	16	13	14	15	15	17	19

To analyze the results, VanGundy [11] proposed that the score of the group's composition form and the assessment of the problem complexity should be summarized. We choose an adapted scoring system from 0 to 20, and the assessment of the project's complexity score from 0 to 30. We observed in Table 2 and Table 3, certain homogeneousness in the results of the assessment of the Team's Composition (Table 2), and in the Complexity assessment (Table 3). We are inclined to think that these results are coherent with the mandatory numbers of teams within the competition and their freedom to select their subject of work.
It is to notice that VanGundy[11] mentioned that should pay attention to the lowest score. So, we decided to study the variable of the knowledge of the domain and the subject matter of the project, inside the item of Problem Complexity Assessment, as seen in Table 3.

4.3 Production of ideas (time variable)

On Figure 2, we find the results of the number of ideas produced and the time when the idea selected appeared. On Figure 3 we show the amount of time spent in group work according to the teams themselves to the idea development process: ***1i*** is the time that the first idea appeared and ***iD*** when the team finish the process of idea selection and then the team begins to work in the presentation.

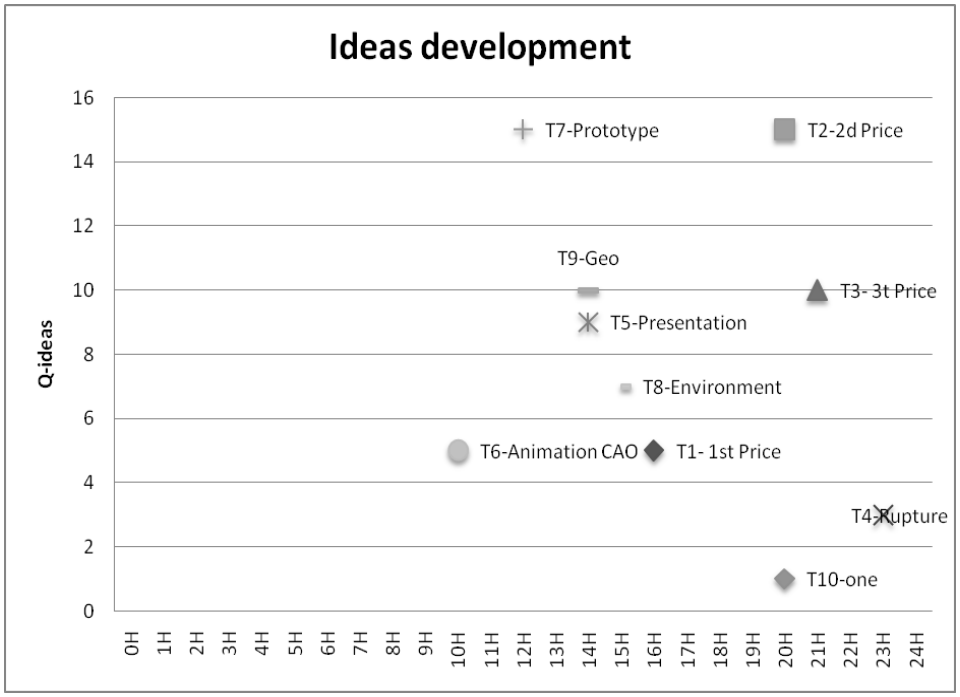

Figure 2. Number of ideas produced and time of idea selection throughout the competition.

In Figure 2, we placed the total production of ideas ***(Q-ideas)*** throughout the 24 hours until the time of the selection of the idea. The teams that came up with a large number of ideas, such as T7, T2, T9 as well as, the teams producing a limited number of ideas, such as T10, T4, T6 or T1 proceeded at a slower rate in reaching their selected idea.
Nijstad et al.[12] explain that the teams can limit their creative flow by becoming attached to an idea too early in the process or by lacking of an idea selection. Another aspect that stands out while analysing this data is the importance given on details or deadlines. Also, the early work impacts the ideas production like seen in Figure 2. The teams that resort to different tools for modelling their ideas or that do practical experiments, progress much faster in the selection of their idea. We would like to highlight that team T6 and T7 were the most prepared in regards to informational tools. They also developed the most sketches and designs, and even asked for help from the organizers to ensure that their selected idea was properly targeted within the criteria of competition.
In the teamwork dynamics, as shown the Figure 3, we could see a different pathway of development between the teams that were awarded by the project T1 to T4, and the teams T5 to T10 which developed some project characteristics: the presentation, the animation or the prototype realisation.

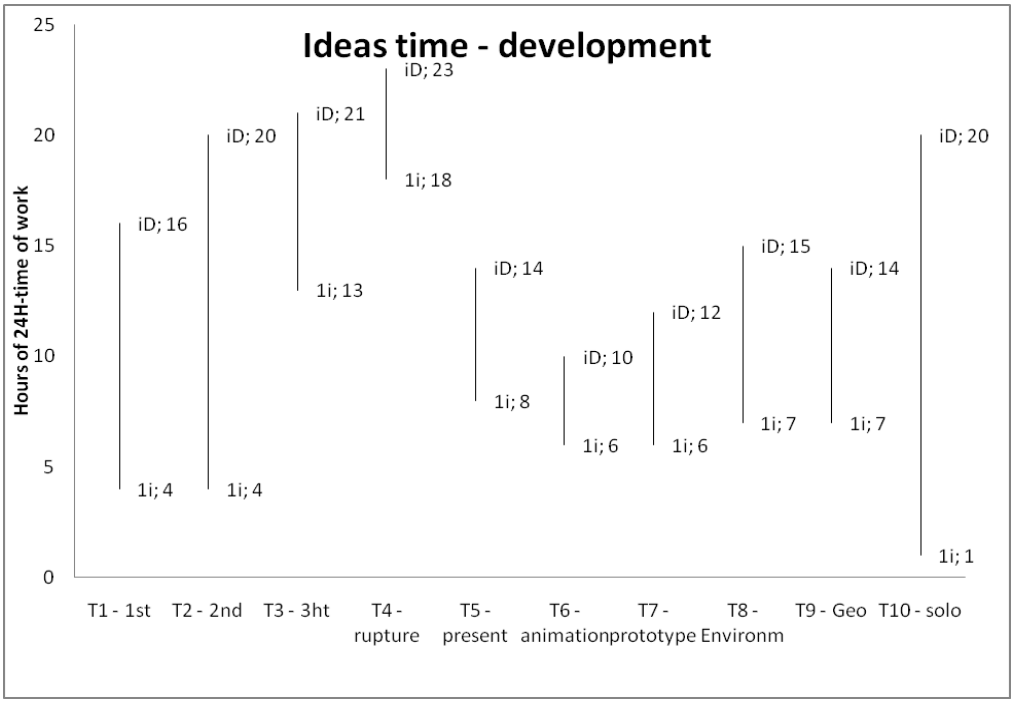

Figure 3. Time of development of the ideas by team.

As seen the Figure 3, the winning teams begin a creative teamwork quickly. Four hours later of the beginning of the contest, the T1and T2 were able to begin their creative work, while the others teams begin their work after six hours at least. In contrast, T1 and T2 had more time for the development of the idea from 16H to 20H. The teams T5, T6, T7, T8, and T9 have an early process of idea development from 10H to 15H; they spend more time in the detail work of the idea selection. In that way, T5, T6, T7, T8, and T9 spend more time in some aspect of the idea presentation. The team T4, awarded by the price "*Rupture"* or "Breaking down", had an atypical performance. It has a very low number of ideas (5) and a later process of development and selection. T1, T2 have a better understanding of the subject matter of their project and also apply a strategy of more elaborated ideas and product definition. The strategy of T5, T6 and T7 was centered on the presentation of one idea less matured, in the next section; we will propose an analysis of that kind of teamwork. The teams with experience on the subject matter of the project such us T1 or T8, produced the lowest number of ideas, as well like the T4 or T6 with the least experience. T2 and T7 produced the higher number of ideas. T4 and T7 needed the most amount of time to select their final idea as seen in Figure 2.
About the difference between the behaviour of the teams and the number of ideas produced, we do not observe particular tendencies of ideas production number. The previous knowledge in subject or in the domain seems to have an influence on the process of decision about the selected idea or the time of development. Kunde [13] proposed that the decision criteria has the following characteristics: "timeliness and sequence, efficiency, durability, coordinator role, consistency, balance and the longer range impact"(p.123). It seems to be present the influence of these characteristics to the group dynamics, as showing in Figure 4.

In the empirical study of 24H at Montreal [9], we had highlighted the fact that previous experience within the chosen subject matter plays the smallest role of all the evaluated points of Problem Complexity Assessment. In that way, we had contrasted the total points obtained by each team with the ideas produced in the work session.
The analysis of the variable about the previous knowledge in the subject or the project domain show a related correlation with the time of beginning the process of idea production and we obtain a correlation of -0,416. This correlation demonstrates that the previous knowledge had a relation with the time that the team spends in beginning their idea production, but not in the number of the idea produced. At least, in large teams (more of 5 members), the team performance could be defined by the experts or 1 or 2 members that have enough knowledge about the problem or about the solution, who finally added the knowledge and the experience to the decisions of the team.

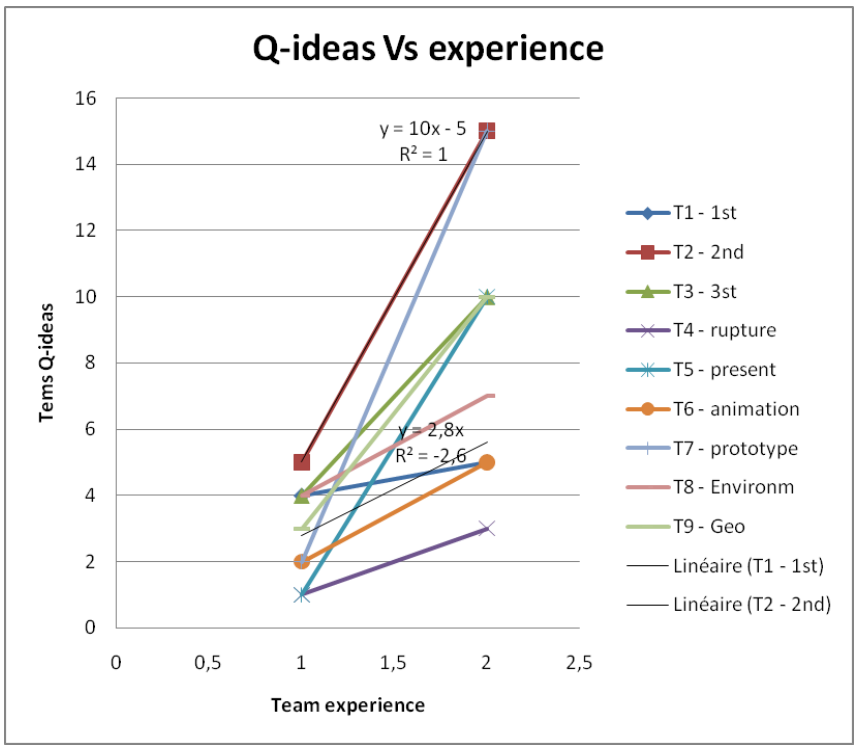

Figure 4. Analysis of the correlation between the quantity of produced ideas, the previous experience in the subject matter and the needed time to develop the idea for the presentation.

In Figure 5, we observe that the variables: Time of the first idea was produced, and the Subject-K (Knowledge) or Domain-K, have the same behaviour. In contrast, the variable Q-ideas had a non related behaviour, it depends of the others variables inside the teamwork dynamics. Also, the variable 1st-idea (First idea to be produced) had a correlation with the domain experience of -0,452.

The group dynamics in the team idea building [14] will be defined by the social interaction between theirs members. In the next section, we analyse the influence of the number of participants and the leader that it could be significant into the larger teams.

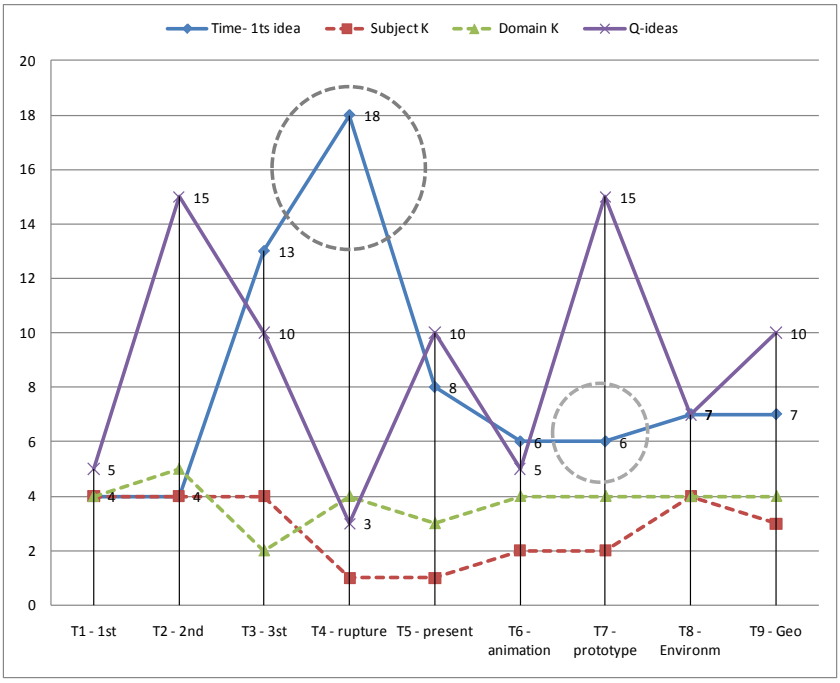

Figure 5. Analysis of the correlation between the quantity of produced ideas, the previous experience in the subject matter and the time of the first idea appeared.

4.4 Large and small teams

We had the opportunity of observing the performance of the small teams during the 24H of Montreal and the large teams of 24H of Bidart. A comparison of the performance of these teams during the competition shows main differences, as we could see at Table 4.

First, in small teams seems to be easier to share a bigger number of ideas when the teams do not have enough knowledge of the subject K of the project.

Second, in large teams the number of the produced ideas had no a direct correlation with the subject K of the project. In this case, we observe a phenomenon of dispersion of the judgment; the members who have the K participate in the creative process. Moore [14] mentions that in a larger group the complexity of the ill-defined problem "often can be addressed only by pooled intelligence" (p.16). This pooled intelligence "obtain the views of the critical actors" and "concern about the consequences" (idem) of the project.

Third, we should note that there may be the basic differences between the Canadian (Montreal 24H) and the French teams (Bidart 24H). In turn, these social and cultural differences of the teamwork dynamics generate different periods of work, different ways to share ideas and more moments of reflection or evaluation.

Table 4. Montreal 24H and Bidart 24H comparison

	Montreal 24H	Bidart 24H
n-Team participants	3 to 4	1 to 11
Correlation n-Ideas and K-subject	-0,77	0.2
Correlation n-ideas – Time Idea developed	0,46	-0,22
1st idea selected in 1st Team	10H	16H
1st Team n-Ideas	15	5

In 24H at Montreal study, the correlation between these variables was negative: - 0.77. In this study, 24H at Bidart, we obtained a correlation of 0.197 between the previous knowledge of the project subject and the number of the ideas production (Q-ideas), as seen in Figure 4 and the comparison at Table 4.

4.5 Leader role and his self-esteem

We assume that in the creative teamwork, in particular in the larger teams, the leader had a special role in the team performance. In order to improve the creative potential of the groups [11] "group leaders can exert considerable control in helping groups to attain this potential […] among the important group condition that a leader could control to some extent are openness to the ideas of others, willingness to take risks, perception of the internal environment as nonthreatening, feeling of freedom and spontaneity, and in general atmosphere of trust"(p. 7).

As discussed earlier, the leader influences the team dynamics and in our case, he could determine the team idea selection and the team idea development. [15] proposes to "consider design as an activity carried out by both a "designer" and three other actors roles: a legislator, an evaluator, and a prescriber. Each of these roles has a partial vision of the artifact knowledge, can modify some (but not all) parameters, can be requested to act or react, can freely make propositions, and warrants part of the proposition"(Ibid, p.79). Into the management of the knowledge of the team and in the group idea selection or development, the leader could act like: "a proposer, a prescriber, an evaluator or an legislator"(Ibid, p.83). The data obtained does not let us to analyze more deeply these roles, but we could observe that the leaders of awarded teams had a relative high score in for variables: sharing of the knowledge, ideas acceptation and control, as seen in Table 5.

During the 24H we take three kinds of data of the self-esteem reported by the leader. Each one reported a score of 5 in the beginning of the contest. Suddenly, in the teams: their leader reported a minor variation of the self-esteem reported de 5 to 4 in the second and the third time of the data collection. We assumed that this low of self-esteem perception had a relation with the stress experimented at the closure of the contest. At that time, the leader has to face with more tension, but as

we see in Table 5, T3 and T4 do not were influenced in their performance for the less of control of their leaders.

Table 5. Leader intervention assessment

Scores	T1	T2	T3	T4	T5	T6	T7	T8	T9
Leader K-sharing	5	5	3	4	5	5	5	5	5
Leader ideas acceptation	4	4	4	2	5	5	4	5	4
Leader process control	4	4	3	3	4	4	4	4	3
Self-esteem	5	5	4	5	5	5	5	5	4
Total	18	18	14	14	19	19	18	19	16

5. CONCLUDING REMARKS

The teams' work dynamic is the main subject to quick project development QPD and is favourable when teammates possess appropriate characteristics, both personal and as a group. Essentially, they must possess creative traits such as: tolerance to ambiguity, perseverance, flexibility of thought, the use of different media or research tools and the creative nourishment of the chosen idea. Moreover, the results are favourable when there are balances between previous experience in the subject matter of the project and a large number of ideas produced in an earlier period of time, and awareness and extended process of "nourishing" produced ideas, and an assertive process of selection (clarity or non ambiguity with jury criteria).

In this research, we did not find enough information or data to concluding the importance of the group maturity (time of the group work together for more than two years), such as shown the Table 1, 58% of the awarded team had more than two years (at least one pair) of working together or the inter-domain or inter-disciplinary and it has effects on the team performance.

The range of professions amongst the participants creates an interdisciplinary effect, and we assume that this could have a positive effect on the team's composition and on the assessment of the perceived complexity of the issue. Nevertheless, the multidisciplinary group or the skills diversity did not have a direct influence on the results. In the competition, we remark that almost the 58% of the winning teams had members of different discipline and, teams who share the same discipline, were composed of students of different universities or were novice students of first years. We consider more relevant the previous knowledge of the participants into the subject matter of the project. Also, it is important that participants select their subject of work freely, that it gives a certain level of comfort in the creative work. Informally of the research protocol, participants expressed the existence of an adequate work environment, although they were faced of a competition.

Other aspect that we analyse is the main focus of the team's strategies. The work of T1 and T2 was focused on the strategy of "idea definition and development", they took more than 16 hours of idea analysis and selection, while the other winning teams spend less time in the idea definition or selection and took more time to prepare the presentation (see Figure 3 and section 3.2), we observed a strategy of "idea presentation" rather than a strategy focused into the creative work or conscious search of innovative results.

The leader role seems to be essential for the teamwork dynamics of larger groups. Leaders of awarded teams had a relative high score of items: knowledge sharing, ideas acceptation and process control. We did not find a remarkable difference between the leaders intervention of awarded teams. We take only in account the perception of others participants, but it could be more effectively for beyond researches, a bidirectional analyse from leader perception and team perception.

Finally, we have observed the existence of two obstacles or situations that slow the dynamics of quick project development QPD*:* a) previous experience with issues in the field of work to be developed and only a small quantity of ideas produced, and b) minimal experience in the subject matter and a large quantity of ideas produced. Both situations slow down the completion of the project [9] in small and large teams. In other words, if previous experience: the previous knowledge of subject matter produced a reduced number of ideas, what other skills or strategies allow the creative development of

the team to improve? Moreover other questions as the influence of the small and bigger team on the creativity, also the influence of the previous knowledge, etc. will be the object of future research.

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