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PROOFS OF UTILITY, INNOVATION, PROFITABILITY AND CONCEPT FOR INNOVATION SELECTION

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ABSTRACT
Selecting innovative ideas or projects and comparing them in terms of their potential of value creation in business contexts is a fundamental design task. To that end, we propose to assess four proofs of Utility, Profitability, Innovation and Concept at different levels of maturity along the innovation process. This model has been successfully applied in two situations of practical size. A first experimentation has validated its usefulness for providing a common analysis framework to a multidisciplinary jury of a National innovation grant within an innovation cluster. A second experimentation has validated that an aggregate indicator of the four proof ratings averaged on a set of representative jury members is highly correlated with the estimated potential of value creation of this innovation. This work is a first step towards an automation of innovation selection in a collaborative manner.

Keywords: design selection, idea selection, innovation process, innovation indicator, innovation management

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1 INTRODUCTION

In different entrepreneurship or intrapreneurship situations, there are times where a more or less developed idea or concept must be presented and evaluated by investors to raise public and/or private funds in order to move up a step in the development of a new product and/or service (the process of maturity of an idea or a research project, or go/no-go of a detailed design phase). Yet, currently, no clear method exists to select ideas or concepts with a strong potential for success in the market in the context of a start-up or of an existing business. There is engineering design literature that emphasizes idea generation processes, but outside of the context of business and industry. There is also management science and technology management literature that emphasizes mainly factors external to the innovation project. The success of the innovation project in the market will be based upon these factors, which are generally measured by experts using a business plan. But there exists little or nothing to evaluate the more or less great potential for success in the market of a radical innovation concept or idea presented to a jury of experts. A radical innovation methodology, called Radical Innovation Design® (Yannou *et al.*, 2011; Yannou *et al.*, 2012) was recently proposed for multidisciplinary and business contexts, in order to maximize the potential for success of a radical innovation in a business context. Accordingly, a *UIPC-proofs* model has already been proposed and applied in (Zimmer *et al.*, 2012), standing for four groups of *proof* indicators: proofs *utility*, proofs of *profitability*, proofs of *innovation*, and proofs of *concept*. These proof indicators aim at assessing the potential of value creation of an innovative idea/project in a business or company context. It has been shown in (Zimmer *et al.*, 2012) that this model was highly inspiring to provide a unified framework to assess the potential of innovations in a multidisciplinary way and to make the jury members conscious of their selection decision. The demonstration was made that this procedure was truly appreciated but not that the *UIPC-model* could be used as a predictor or detector of radical innovations with high potential to be successful. This is the objective of the present paper through two large experimentations.

2 LITERATURE REVIEW OF SELECTION METHODS FOR RADICAL INNOVATION PROJECTS

Our study is focused on radical innovation, which is, according to Garcia and Calantone (Garcia *et al.*, 2002), innovation that does not answer expressed needs, but that rouses a demand that was not first articulated by the users before launch. These innovations are therefore riskier and more uncertain than incremental innovations (Boly, 2004). Wright defines innovations in (Wright, 2012) as "*we defined innovation as the successful exploitation of new ideas to increase customer value or create wealth for a company. Innovation is therefore outcome-oriented, with the outcomes being aligned with a company's overall strategy. However, within this broad definition, it is possible to define three levels of innovation based on the degree of "newness" and the degree of "value add"".* He provides a remarkably simple schema to figure out incremental innovations and radical innovations, passing by substantial innovations (see Figure 3, left part). This is a representation of an innovation in a 2D plane with coordinates: *Degree of Newness* and *Degree of Value-Add*. But, of course, no practical measurement indicators and tools are provided for that; at this stage, this is an analogical and qualitative tool.

These ideas are born of a creative process largely described in the field of engineering design. According to Shah *et al.* (Shah *et al.*, 2000), the literature in the domain of engineering design suggests that "*a wide range of formal methods have been devised and used for idea generation in conceptual design. Experimental evidence is needed to support claims regarding the effectiveness of these methods in promoting idea generation in engineering design.*"In this field, the literature focuses more on the creative process and the exploration process that make it possible to produce a concept that creates the most value, and it focuses less on the scheduled launching of a new product and/or service into the market in a business context. According to Wadell *et al.* ((Wadell *et al.*, 2010), the upstream phases of the innovation project are the discovery of an opportunity, analysis of this opportunity, generation of an idea, selection of an idea, and definition of a concept. Several models exist to measure the efficiency of this ideation process. Shah et al. (Shah *et al.*, 2003) proposed four separate effectiveness measures: *novelty*, *variety*, *quality* and *quantity*. Novelty measures how unusual or unexpected an idea is as compared to other ideas. Variety is a size measure of the explored solution space. Quality is a measure of the feasibility of an idea and how close it comes to meeting design specifications. Quantity is the total number of ideas generated. While Shah et al. argued that due to aggregation, information loss can occur in an overall effectiveness measure and thus it will not benefit a design team, they also pointed out a real need for a unique indicator to support project comparison.

Sarkar and Chakrabarti (Sarkar *et al.*, 2011) addressed methods for assessing innovation in such a way as to integrate the notion of development deadlines and degree of creativity—two factors they found missing in Shah's metrics. They also highlighted the need to define the degree of creativity of products where creativity is considered a function of novelty and usefulness.

But the whole innovation process that transforms an innovative idea into a new product and/or service that sees a relative success in a market has barely been touched upon. In addition, the aforementioned works do not address the supervision of a stream of innovative ideas, managing theses ideas or prototypal projects in terms of their maturity and potential of creating value or being successful in the context of the company.

In our study, we are seeking to know if we can measure the potential for market success of a new product and/or service as early as the upstream phases of the conception of an idea, concept, or first prototype. This question is addressed more in innovation marketing and technology management literature, where the authors (Astebro, 2004; Cooper, 2001) consider that the goal sought is the probability that a new idea reaches market rather than simply being "innovative". These authors propose innovation management methods to direct the selection process and the process of transforming an idea into a successful scheduled launch of a product into a market. Cooper (Cooper, 2001) proposes a method, Stages and Gates®, that models the innovation process systematically and sequentially, beginning with the phase of discovery of an opportunity and terminating with the scheduled launch of a new product. The probability of success of a new product and/or service in a market is described as the culmination of a harmonious synchrony of these "stages" and "gates". Astebro (Astebro, 2004) proposes a prediction model of the factors of success or non-success of an innovation project, based on the identification of 36 criteria. This model predicts the relative success, to 80.9%, of an innovation project, but it is for incremental innovations. In the end, these methods and models seem to be well-suited to existing businesses that are equipped for R&D in an operational mindset and that realize incremental innovations. However, they seem less suitable for radical innovations tied to a mindset of exploration, headed by entrepreneurs, often on their own, where the market is known for its complexity and uncertainty. These methods and models offer reference points to formalize and finalize the drafting of a business case while the business wishes to innovate in an incremental manner, but they do not measure value, innovation, or concept potentials of a radical innovation project drawn from need, as proposed by the Radical Innovation Design® methodology (Yannou *et al.*, 2011; Yannou *et al.*, 2012). In these publications (Yannou *et al.*, 2011; Yannou *et al.*, 2012), the authors demonstrate that this methodology solidifies the proofs of utility, innovation, profitability and concept throughout the innovation process from the framing of the problem – so-called *problem setting* stage – to its resolution – *problem solving* stage. Using these three types of proofs is very effective in the secure direction of the development and launching of a radical innovation; Yannou *et al.* (Yannou *et al.*, 2011; Yannou *et al.*, 2012) have shown that there are strong conditional probabilities between creation of actual values and the contribution to solidification of proofs during the phases of problem setting and conceptual design. This methodology is complementary to the SynOpp® method in innovation management (Filion *et al.*, 2010). This method dynamically formalizes, builds, and measures a business case, an aid to the three types of proofs in the Radical Innovation Design® methodology (Zimmer *et al.*, 2012). SynOpp® allows the entrepreneur and the expert to follow, guide, and assess the creation of opportunity from its origins to the beginning of its exploitation. The business case is created in order to assemble the studies that demonstrate that the project owner is capable, that the environment is ready, and that the project is innovative. These are also the three conditions addressed in the Millier (Millier, 1999) model that lead to innovation projects. SynOpp® reconsiders the business plan, criticized more and more by investors for radical innovations for which, by definition, we cannot go by an experience from the market to correctly foresee extrapolations of new market areas. The business plan allows the investor to measure the relationship between the project owner, the opportunity, the context, and the risks in which the project is developed (Sahlman, 1997). A business plan defines the concept, market, business model, marketing plan, product development plan, action plan, project team, risk analysis, and financial projections including R&D investments (Abrams, 2003; Sahlman, 1997).

Finally, we keep in mind that there are selection methods for incremental innovation projects in the fields of marketing and innovation and technology management. There are also methods to support or predict the success of a new incremental innovation project in the market. We show that existing tools, such as the business plan, are not sufficiently suitable for measuring and demonstrating the potential for success of a radical innovation project in the market. Finally, we note that new methods have been developed for creating a business case. However, we note that these methods do not explain the radical innovation project selection procedure enough, nor do they sufficiently explain the role of the experts who analyze these business cases.

3 ROBUSTIFICATION OF UIPC PROOFS ALONG A RADICAL INNOVATION DESIGN PROCESS

With regard to this company context (rarely considered as an input to an innovation process), the goal of RID is to innovate as much as possible, creating positive differentiation in the market and changing the conventional rules of competition. In its essence, RID is a systematic exploration/exploitation process which progresses through four stages.

1) Exploration of value creation opportunities around the *initial idea* or statement. The initial idea/statement is systematically redefined in a more legitimate *ideal need*. Within this new exploration perimeter, existing usages, needs and product experiences are populated, investigated and benchmarked so as to yield input for stage #2.
2) Definition of a promising and coherent *perimeter of ambition* which is a subset of the aforementioned ideal need. This *perimeter of ambition* must represent an opportunistic potential of value creation in the context of the company ecosystem.
3) Definition of value promising product-service scenarios, a.k.a. *briefs*, starting from the perimeter of ambition. These *briefs* must be qualified (often by storyboards) and quantified (market size and consumers' willingness-to-pay).
4) For each brief studied, a systematic listing of value tracks and value drivers, a.k.a. innovation leads (see the use of RID methodology in the context of EADS company (Riánantsoa *et al.*, 2011)) are performed. Each innovation lead is then investigated in the form of a systematic creativity workshop. Findings are combined into consistent design concepts which are subsequently sketched or prototyped and assessed.

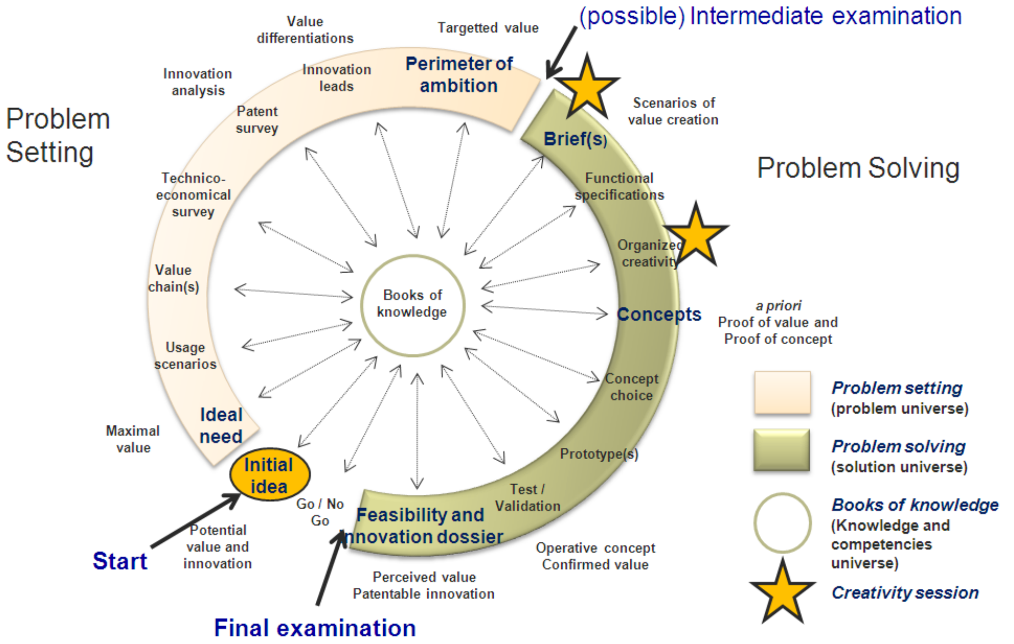

Figure 1. The RID innovation wheel: From initial idea to feasibility and innovation dossier… through ideal need, perimeter of ambition, brief(s), concepts

The RID methodology is organized following Herbert Simon's approach around a two-part macro-process: the problem setting macro-stage and the problem solving macro-stage. Figure 1 represents these two macro-stages within the RID innovation wheel. Of the four radical exploration/exploitation stages identified above, the first two belong to the problem setting macro-stage, and the two last belong to the problem solving macro-stage. The RID innovation wheel spans transition from the *initial idea* or statement to the *feasibility and innovation dossier*, passing through intermediate results including *ideal need*, *perimeter of ambition*, *brief(s)*, and *concepts*. In practice, a series of micro-stages are defined and documented with expected intermediate results and reports, practical examples for inspiration and a toolbox. It has been shown in recent works (see (Yannou *et al.*, 2011; Yannou *et al.*, 2012)) that the quality of the innovative design outcomes was highly dependent of the quality of these RID expected intermediate results and that the overall quality of the problem solving was probabilistically dependent of the overall quality of the problem setting.

A determining concept of RID is the consideration of the conceptual design stage as an investigation process. Investigation is understood as exploring all potential leads and then refining and evaluating conceptual designs that appear to be potential value makers. This investigation is supported by four types of proofs that are built and reinforced throughout the process:

- The proofs of *utility* (noted *U*) for bringing evidence that it is differentiating for users and customers from the existing solutions in terms of service utility.
- The proofs of *innovation* (noted *I*) for bringing evidence that "the invention may be protected and the innovation may be communicated, perceived, understood and valued, i.e. it corresponds to a certain willingness-to-pay".
- The proofs of *profitability* (noted *P*) for the company and customers, i.e. a tendency to improve brand image, to increase the average revenue per user, to conquer new markets or to make clients more fidel (re-purchasing).
- The proofs of *concept* (noted *C*) for bringing evidence that "it works or it is likely to work in situations the service is expected to be delivered";

Definitions of these 4 types of proofs are provided in Table 1. It has also already proposed in (Zimmer *et al.*, 2012) that these proofs be examined along the innovation process, at least at the end of the RID problem setting and the RID problem solving to ensure that tangible evidences have been provided to convince of the value creation potential of the innovation. It has been hypothesized that *Utility* (U) and *Innovation* (*I*) could already be assessed by experts from the exploration process of problem setting and the resulting *perimeter of ambition* that embeds which important need or usage is expected to be covered, which suffering is expected to be alleviated and / or which malfunctions of existing systems expected to be improved. In the same manner, one must wait the problem solving stage and especially:

- the design briefs (usage or service scenarios) to assess *Profitability* (P) for users,
- and design concepts (design principles, architectures) and first prototypes to get an idea of *Profitability* (P) for the company (because of resulting costs) and feasibilities (it really works as expected, i.e. proofs of *Concept C*).

Therefore, in (Zimmer *et al.*, 2012) – see also Table 1 -, two examination juries may be organized to select the promising innovative ideas or projects. It has been proposed that adapted experts to the corresponding proofs to assess be chosen. Roughly, it is proposed three bodies: A for Academics, E for innovation Experts and I for Industry executives. The first problem setting jury (see Table 1) is composed of members of A and E bodies, and the second problem solving jury is composed of members of A, E and I bodies.

Table 1. Definition of the Utility-Innovation-Profitability-Concept proofs

RID stage	Proof type	Definition	Juries bodies
Problem setting	Proofs of **Utility (U)**	Coverage of usage and needs situations of users / stakeholders for which important needs are covered, suffering alleviated and / or malfunctions of existing systems improved	
	Proofs of **Innovation (I)**	Real innovation, claimable, protectable, perceived and valued by users and customers	
Problem solving	Proofs of **Profitability (P)**	Expected profitability for the company and customers. Tendency to improve brand image, to increase the average revenue per user, to conquer new markets or to make more fidel clients (re-purchasing)	
	Proofs of **Concept (C)**	The conceptual solution or prototype functions effectively and efficiently in expected situations. Technological and industrial feasibility	

The two selection stages aim first to eliminate the low utility and low innovation projects and then to eliminate the low profitability and low concept performance projects.
Two experimentations of practical size follow. The first concerns the evaluation of 20 innovative projects within an innovation cluster for selecting a subset of 4 promising ones for further coaching and start-up incubation. The second one concerns the evaluation of 15 innovation projects led in university but with industrial clients. The two experimentations clearly demonstrate the usefulness of our model:

- not only for allowing multidisciplinary experts to be stimulated to analyze with a common language and to adopt a common vision in order to measure the potential success of a radical innovation in the market,
- but also to use it as an automated rating and ranking method that is highly correlated with the estimated potential to be successful on the market by experts.

4 FIRST EXPERIMENTATION OF PROJECT SELECTION AND COACHING IN AN INNOVATION CLUSTER

Sol'iage (see www.soliage.com/) is a business and organization competency cluster, made of 50 institutions, that financially supports radical innovation projects headed by entrepreneurs as early as the phases upstream of the design of a new product and/or service in gerontechnology (see (Harrington *et al.*, 2000)). Sol'iage started a radical innovation project selection procedure 9 years ago, in the context of the "Charles Foix grant". This procedure detects radical innovation projects that have strong utility, innovation, profitability and concept potential relative to the pathological situations in healthcare that are not yet covered by existing products and/or services and which have the potential to create employment in existing or by start-up companies.
The Charles Foix grant steering committee allowed us to test our radical innovation project selection model for the 9th annual Charles Foix grant. The call for projects took place between April 2012 and October 2012. 22 submitted projects were appraised and more than 20 experts in *Academia* (body A), innovation (body E, like *Experts*) and the gerontechnology market (body I, like *Industry*) were called upon. The overall sum of the grant endowment was nearly 70,000 Euros. The two-round selection process described in section 3 has been strictly followed. A pre-selection jury has ruled out two registered projects for not having provided enough information about the project. Figure 2 shows the details of the process. Jury #1 "Problem setting – Utility and Innovation" composed of 12 jury members of bodies A and E have examined the 20 projects on dossiers for, finally, selecting 7 of them. Among these 7 projects, Jury #2 "Problem solving – Profitability and Concept" composed of 15 jury members of bodies A, E and I have selected 4 innovations projects which deserve to be granted and coached for 1 year to robustify a business plan, and 2 others which deserve to be labeled by the Sol'iage cluster without any particular aid because they are already robust enough.

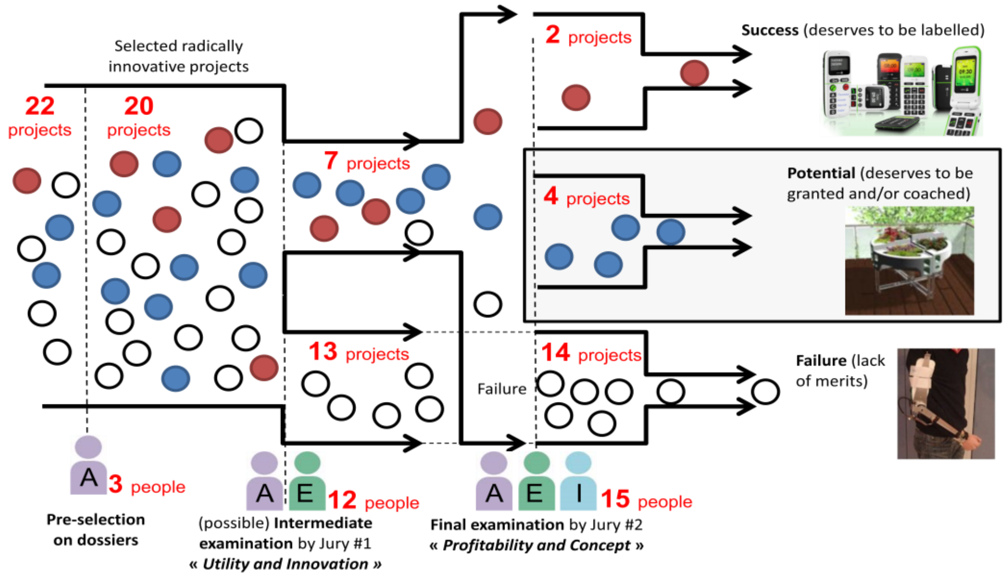

Figure 2. The selection procedure of Charles Foix innovation grant following the two-round UIPC-model selection process

In addition, a detailed chart of 22 pieces of evidence of utility, innovation, profitability and concept (see Table 2) has been carefully defined and sent to the two sets of jury members in advance to prepare minds to discuss of a variety of aspects influencing the success of radical innovations. Table 2 shows also that the rating of these 22 evidence pieces of UIPC proofs can serve, for the 4 selected projects to be coached for one year, as well for a preliminary assessment of UIPC proof maturity, as for driving the robustification process of the one-year coaching (not developed further in this paper).
For aiding the jury members to think aloud to a variety of selection dimensions, we provided them with sheets of papers for each project. Under each of the 9 (for jury #1) and 13 (for jury #2), respectively, evidence pieces, they were asked to assess two dimensions (see Table 3):

- the strength of evidence, i.e. the degree of certainty and persuasiveness of this evidence piece
- the level of potential, i.e. the power and pertinence of this evidence piece

For instance, one can be sure of an evidence which has low interest, leading to *certainty*=3 and *level*=1.
Finally, these numbers that we incented jury members to deliver were not communicated to other people but they were let to the self-appreciation of everyone and transmitted to us for further correlations with selected projects. In definitive, juries had intense discussions and were free to make their decisions to select or not the projects for the next round by a conventional vote procedure (not detailed here).

Table 2.Detailed chart of 22 pieces of evidence of utility, innovation, profitability and concept proposed during the Charles Foix grant of innovative projects. To the right, the initial assessment of the project next to the final assessment after the one-year coaching

Stage of the procedure	Proof type	Evidence
Problem setting or « Utility & Innovation » Jury #1	Proofs of **Utility (U)**	Definition of the general problem
		Identification of the target
		Relevance of the usage
		Ideal need expression
		Integration of the constraints (legislative, legal, ethical, economic)
	Proofs of **Innovation (I)**	Knowledge of the value chain
		Legal watch
		Technical and economic watch
		Exploitation of the sites of innovation
Problem solving or « Profitability & Concept » Jury #2	Proofs of **Concept (C)**	Planning of the project's actions
		Description of the concept
		Financial management of the project
		Degrees of skill and knowledge of the project initiator
		Existence of project partners
		Risk analysis of the project
		Validation process of the developmental milestones of the project
	Proofs of **Profitability (P)**	Development of the distribution chain of the future product / service
		Development of the value creation strategy
		Development of the business strategy
		ROI for the project initiator
		Quantification of the service rendered for the usage situation
		Quantification of the service rendered for the user

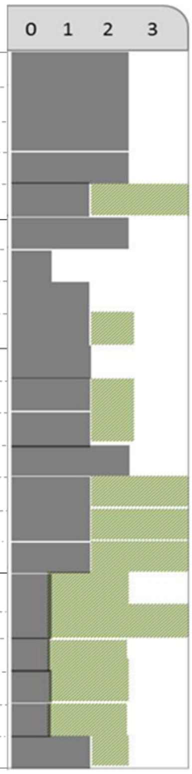

Table 4 compares the post-calculated averaged ratings with the selected projects. It is remarkable to notice that Jury #1 composed of 12 people has finally selected 7 projects for the second selection round which have been ranked {1, 2, 3, 4, 5, 7, 8}, in just omitting project #19 ranked 6th with our rating system. In addition, during the second selection round, Jury #2 has finally selected 4 projects among 7 which have been ranked {1, 2, 3, 5}, in just omitting project #20 ranked 4th with our rating system. We do not advocate for using our rating system systematically, but our experiment highlight that our UIPC model and its 22 evidence chart has been a clear frame of reference for the much diverse experts from the juries to develop a more collective vision of the expectations of a radical innovation project. It was already confirmed by a recent study in (Zimmer *et al.*, 2012) where a satisfaction questionnaire was administered to the experts after their testing of our model. It showed that the procedure we are proposing is effective. Firstly, it gives structure to a discussion on the interest of allotting funding and/or support to an innovation project. Secondly, the use of an evaluation chart allows the experts to create a common language in order to measure the success of a radical innovation in the market.

Table 3. The two dimensions under which each piece of evidence is rated

Aggregation of 2 dimensions : 1rst dimension ⇩ 2nd dimension ⇩

Rating	Strength of evidence (certainty)	Level of potential
0	Absent	Null
1	Some elements	Weak
2	Credible elements	+ Average
3	Undeniable and complete set of elements	Strong → 4

Table 4. Final ratings calculated by us after collecting individual ratings and averaging them. The grey boxes outline the selected projects after the first and the second selection juries.

Project ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1rst jury: U+I	20	4	12	17	11	9	X	15	10	16	7	19	1	18	12	8	X	X	6	5	3	2
2nd jury: P+C		7									3		1			5				4	6	2
U+I+P+C		7									3		1			6				4	5	2

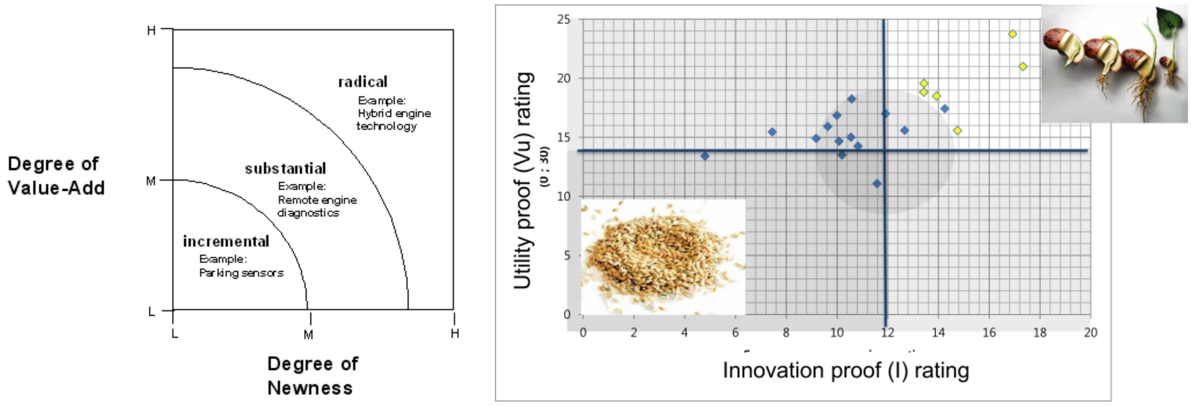

Figure 3. Our rating system based on the UIPC-model perfectly emulates the Newness/Value-Add described in (Wright, 2012), given in left part

It is also very satisfactory to plot *Innovation* (*I*) ratings (comparable to *Degree of Newness* in Figure 3a) and *Utility* (U) ratings (comparable to Degree of Value-Add in Figure 3a) into a 2D representation in Figure 3 (right part) to figure out that it is a similar schema than the one proposed by Wright {Wright. 2012 #1380} in Figure 3, left part. Indeed, the 7 selected projects after selection round #1 are the ones in the right-upper corner of the plot after eliminating projects of low utility, low innovation and keeping the ones combining at best both!

5 SECOND EXPERIMENTATION ON 15 PROJECTS IN UNIVERSITY

The second experimentation concerns the evaluation of 15 innovation projects led in Ecole Centrale Paris during the “innovative design of products and services” course SE2200. These projects are based onto 6 initial ideas provided by 6 companies which are themselves founding or participating members of the Sol’iage innovation cluster. Therefore, the innovation sector was also about developing radical product and/or service innovations for elderly people, for aiding them to live better and longer in autonomy, happiness and respect. Naturally, these “industrial clients” of projects were composing the I evaluation/selection body.

Here, the objective was not to select a promising innovative project but to provide a grade for the pedagogical activity. The process followed has been different and simpler than the fist experimentation’s:

- Only one jury was composed of A, E and I body members at the end of problem solving,

- Each jury member (they were 12) was asked to directly assess (see Table 5) a *Utility* (U), *Profitability* (P), *Innovation* (*I*) and *Concept* (*C*) rating on a two-dimensional scale (*certainty* and *level*), avoiding the detailed set of 22 pieces of evidence of Table 2.
- *Certainty* and *Level* have been summed to make an elementary proof rating for each jury member, project, and UIPC proof.
- A pedagogical grade (a number between 0 and 20 in France) has been also independently asked to each jury member for each project. This grade was supposed to "*assess at best the potential of the given innovation to be successful in the market*".

The results of correlations between the scholar grade supposed to "*assess at best the potential of the given innovation to be successful in the market*" and each of the elementary U/I/P/C proof ratings and their summation are shown in Table 6. They confirm that our UIPC assessment method could almost be used in a eyes-shut manner by a multidisciplinary innovation jury. Indeed, two series of correlations have been established in Table 5. The first series calculate the correlations between a given UIPC proof rating or of (*U+I+P+C*) summation with the grade delivered, for the whole set of jury members or by body. The second series performs a first average on UIPC proof ratings and of the delivered grade per project for all the jury members having assessed it; afterwards the correlation is performed on averaged ratings and grades per project.

First, for both series of correlations, the correlations with the summation (*U+I+P+C*) is greater than any of the correlations with an elementary UIPC proof rating, demonstrating that the four indicators bring their part of relevance in the contribution to the potential success of an innovation.

Second, the correlations are individually good with the delivered grade with 0.776. But the correlation per groups is excellent with 0.976. It means that when the jury is adequately composed of a variety of body members, averaging the *U*, *I*, *P* and *C* ratings may lead to a predictable grade for the group! This is a tremendously important result since this grade evokes the assessed potential of an innovation to be successful on the market by a representative group of experts. Other results need of course to be obtained in other experiments but this is already a very interesting result for partly automating innovation selection by a set of experts along the innovation process.

Table 5. Rating sheets filled by the jury members to assess the innovation projects in university

	Project #1			Project #2		
	Certainty	Level	rating	Certainty	Level	rating
Proof of **Utility** (U)	1	2	3	2	2	4
Proof of **Profitability** (P)	2	1	3	1	1	2
Proof of **Innovation** (I)	0	3	3	3	1	4
Proof of **Concept** (C)	3	3	6	1	2	3

Table 6. Correlations between the grades delivered and the UIPC proof ratings

	All juries	Body A Academics	Body E Experts	Body I Industry
Correlation (UIPC and grade) per jury member	**0.776**	0.737	0.758	0.940
Correlation (UIPC-avg and grade-avg) per group	**0.976**	0.940	0.702	0.963

6 CONCLUSION

We mentioned that Shah et al. (Shah *et al.*, 2003) proposed four separate effectiveness measures of innovation: *novelty*, *variety*, *quality* and *quantity*. Their *Novelty* may appear to be somewhat similar to our *Innovation* (*I*) proof but this is only apparently because our definition of Innovation is much closer to companies, start-ups and markets with "*Real innovation, claimable, protectable, perceived and valued by users and customers*". *Variety* and *quantity* do not exist in our model since our innovation process RID privileges more a careful and systematic exploration of usage and need segments which are not today covered by existing solutions and which correspond however to important needs to cover, suffering to alleviate or dysfunctions to fix. We have proposed instead the *Utility* (U) in these terms. In addition, if *variety* and *quantity* may be of some interest for supervising the design process, it does not guarantee the *utility* (U) of the idea finally selected by the company to further develop and launch on the market. We prefer to confide this mission of boosting the innovativeness to the RID process itself and to measure the effective potential of the framed problem or of the most promising emerging brief and concept. Lastly, the proof of profitability and the proof of concept (it works well and it is feasible) have been added as essential for innovation in a business perspective.

While Shah et al. (Shah *et al.*, 2003) argued that due to aggregation, information loss can occur in an overall effectiveness measure and thus it will not benefit a design team, they also pointed out a real need for a unique indicator to support project comparison.

We believe we are on the way to get one aggregate indicator today, adapted to measure the potential of a radical innovation in a business context. Our model is based on the presence of 4 proofs (see Table 1) to reveal this potential, this is the Utility-Innovation-Profitability-Concept (UIPC) model of proofs. Each of the 4 proofs is a probabilistic measure composed of a degree of *certainty* and a *level* or magnitude of potential (see Table 3).

This model has been used successfully a first time in the context of an innovation cluster to select, grant and coach the most promising innovative ideas or projects. We clearly show that the selected projects have almost been the best rated by the aggregate indicator UIPC ($U+I+P+C$) averaged on the jury members carefully chosen to be complementary in 3 expert bodies. This model has been used successfully a second time in the framework of delivering the final grade to innovation projects in an engineering department. We find a remarkable correlation between the aggregate indicator UIPC ($U+I+P+C$) averaged on the jury members for each project and the average grade assigned to the project and which was assumed to "*assess at best the potential of the given innovation to be successful in the market*".

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