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Is there a Hawthorne effect?

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The experiments conducted by Elton Mayo and his team from Harvard at Western Electric's Hawthorne factory led to the formulation of the well-known "Hawthorne effect": the staff's attentive attitude staff motivated wage-earners' behaviors. However more and more studies have questioned these findings and conclusions. This critical, historical reinterpretation of these experiments is based on a review of the literature in several disciplines.

Six experiments were conducted from 1924 to 1933 in five different departments at Hawthorne Works (Cicero, Illinois), where Western Electric employed approximately 29,000 people to make telephones and the switches and cables for them. The objective of these six experiments, some of them carried out simultaneously, was to investigate the effects of fatigue, monotony and lighting on worker productivity. Homer Hibarger, a white collar at the factory, and Charles Snow, a researcher from Massachusetts Institute of Technology (MIT) performed the first experiment. The five others were undertaken by a team from Harvard (Mayo, Roethlisberger, Whitehead, Whyte and Warner) starting in April 1928. This program was under the control of Western Electric's staff (Pennock, Hibarger, Wright and Dickson). The reports were not analyzed or published till a few years later by Whitehead (1938) and then in more detail by Roethlisberger and Dickson (1939).⁽¹⁾

Since then, these experiments have become well known for their finding of the "Hawthorne effect", which refers to the improved productivity of wage-earners owing to the mere factor that the staff shows more interest in their work. For the school of human relations and, more broadly, the theory of organizations, the Hawthorne experiments made history, since they took the human variable into account and refuted scientific management, *i.e.*, Taylorism (HASSARD 2012).

This research, owing to its opacity, has aroused many reactions. Authors have called it a "myth" (BRAMEL & FRIEND 1981, BERT 1999), "flawed theory" (RICE 1992), "fable" (GALE 2004) and even "urban legend" (KOMPIER 2006). However the studies discussing these experiments have not always fully presented them. Olson *et al.* (2004) have analyzed what the 21 textbooks on organizational psychology that rang up the highest sales on Amazon.com in 2003 had to

say about these experiments. All these textbooks mentioned the experiment on lighting, thirteen described the "first relay assembly test room" experiment; twelve, the "bank wiring observation room" experiment; and six, the "interviewing program"; but none of them mentioned the "mica splitting test room" and "second relay assembly" experiments.

We are forced to admit that the managerial sciences and (even more) human resource management have remained impervious, out of naivety or denial, to the criticisms directed at these experiments. So, we can legitimately ask: is there a Hawthorne effect and should we still be talking about it?

This article reviews all six experiments and, too, the controversies and criticisms surrounding them. After presenting the experiments chronologically so as to follow their "logical" succession, both their findings and conclusions will be brought under scrutiny. A review of the literature in several disciplines will then serve as the grounds for rejecting the existence of a Hawthorne effect.

A myth is born: The artificial lighting experiments (November 1924 – April 1927)

On the initiative of the National Research Council of the National Academy of Science,⁽²⁾ and with funding from General Electric, the manufacturer of electric light bulbs, four series of experiments (called "illumination studies") were carried out on artificial lighting at the Hawthorne Works between November 1924 and April 1927. At the time, the only lighting in the workshops came from the windows and/or skylights, a source of problems

⁽¹⁾ This article has been translated from French by Noal Mellott (Omaha Beach, France). The translation into English has, with the editor's approval, completed a few bibliographical references.

⁽²⁾ Frank Jewett, who headed Western Electric's workshops, became president in 1923 of the engineering division of the National Research Council and convinced them to choose Western Electric (DESMAREZ 1986).

during bad weather. The goal was to show that improving the lighting would increase wage-earner productivity. Besides this material condition other factors came into play, namely: the friendliness of management and piece-rate pay.

Conducted by Snow in November 1924, the first experiment lasted five weeks. This “*illumination test I*” was performed in three departments where ceiling lights were installed. Each department had a test (N=9) and a control (N=30) group; and a “normal” lighting of 5 fc (foot candles, the standard unit of lighting in the United States). Varying the lighting in the test group (from 3 to 46 fc) had no significant impact on productivity; the results were scattered, varying from service to service (SNOW 1927, PENNOCK 1930, WREGGE 1976).

A second experiment (“*illumination test II*”) was conducted from December 1924 till the following summer. The participants, all of them from the same department, were divided into a test and a control groups, each with ten members. Each group was placed in an experimental workshop with artificial lighting. The intensity of the light varied from 24 to 70 fc in the test group while, in the control group, it remained more or less constant (16-28 fc depending on the season and time of day). There was no group effect; production increased in the same proportion. However there was a problem with this experiment: the lighting could not actually be controlled owing to daylight.

In 1926, Hibarger, with Snow’s help, decided to carry out another experiment (“*illumination and psychological test*”) with artificial lighting alone so as to avoid this bias. The windows were made opaque. Three groups of ten participants were formed, a control group with constant lighting (5 fc), a test group with lighting that

dimmed by 1 fc (from 10 to 3 fc), and a “psychological” group who were led to believe that the lighting varied whereas it remained constant (In the presence of participants, the light bulb was replaced with another bulb but of the same intensity). Referring to the results from this last group, Hibarger argued that the increase in production was to be set down to direct supervision alone. However Snow (1927) reported that production had not increased but, in fact, had fallen in all groups. According to Roethlisberger and Dickson (1939, pp. 14-18), productivity increased very slightly in the three groups. Given these contradictory conclusions, doubts have never settled. Roethlisberger and Dickson did not take part in this experiment, and their report is a secondary, cursory source that devotes but four out of 604 pages to the lighting experiments. Apparently, Snow’s conclusions were more accurate, since he was a researcher involved in this experiment. The results for the “psychological group” were ambiguous. In 1956, Hibarger admitted that no subterfuge had been used in this group (WREGGE 1976).

From these three experiments, Snow (1927) concluded that making the lighting dimmer or brighter had no effect on productivity. For this reason, he and the members of the National Research Council gradually withdrew from this program in 1926. According to Snow, the explanation of any variation, when it occurred, could be set down to: 1) supervisors’ pressure on employees; 2) physiological (e.g. headaches, tiredness, etc.) and psychological (e.g. daydreaming, coming vacations, etc.) factors; and 3) the family environment.

In 1927, Hibarger decided to informally conduct his own experiment with two women workers from assembly in the test group and two others in the control group. This “*moon-light test*” had eleven phases (cf. Table 1).

Phase	Changes made		Period (1927)	Output
	Test group	Control group		
1	Normal conditions in the department		28 January – 3 February	100%
2	Moved to experimental workshops		4 February	Increase
3	Morning: 1.0 fc Afternoon: 0.39 fc	5.0 fc	5 February	Increase
4	0.200 fc	5.0 fc	6 February	Increase
5	Morning: 0.200 fc Afternoon: 0.102 fc	5.0 fc	7 February	Slight decrease
6	0.080 fc	5.0 fc	/	Stable
7	0.060 fc	5.0 fc	/	Sharp drop
8	1.4 fc	5.0 fc	28 February	Slight decrease
9	Switched experimental workshops		1 March	Increase for both groups
	11.0 fc	5.0 fc		
10	The supervisor’s office placed in the workshop		21 March – 9 April	119.5% & 117%
	11 fc	11 fc		
11	The supervisor’s office still in the workshop		9 – 23 April	119.5% & 117%
	1 week	2 weeks		

Source: Wrege (1976, pp. 14-15).

During the first phase, the women stayed in their department so that researchers could gauge their individual productivity. During the following phase, they moved to an experimental workshop. The first day that lighting was varied (phase 3), it was set at 1.0 fc in the morning and 0.39 fc in the afternoon for the test group, whose productivity fell slightly lower than the control group's. The next day, the lighting was dimmed to 0.200 fc all day long; and the test group's productivity increased. During the fifth phase, the intensity was reduced to 0.102 fc in the afternoon, and production fell off slightly. When it was dimmed to 0.060 fc (the equivalent of moonlight, whence the experiment's name), the test group's productivity drop (phase 7); and the women objected. During the next phase, the lighting was slightly increased. As of the ninth phase, the test and control groups switched rooms; and the lighting for the test group was now 11.0 fc. The productivity of both groups increased. During the tenth phase, Hibarger's office was placed in the middle of the workshop for a few weeks. The rate of production increased, steadying at 119.5% for the test group and 117% for the control group. The last phase confirmed these results. Phases 9-11 demonstrated the importance of direct supervision on productivity.

What to conclude from the tests on lighting? Throughout this series of experiments, it is clear that the intensity of electric lighting was not related to output. But in reference to the results of the last phases, Hibarger suspected that supervision did have a positive impact. Many questions were left hanging. Why did production decrease during the afternoon? Was it lower Monday and Saturday? Was fatigue a factor? Should breaks be introduced to relieve fatigue? Should the workweek be shortened? To answer these questions, Hibarger set up a new experiment, the "first relay assembly test room", that would become a flagship for the school of human relations.

The first relay assembly experiment (April 1927 – June 1932)

The work of assembling relays was tedious, a task taking from 40 to 50 seconds. The women doing this had to assemble 35 parts in a relay switch box. Each worker managed to do about 50 boxes per hour, and had an average output of 2400 per week.

Hibarger formed a group of six workers by selecting two women who were known for their ability to maintain friendly relations and then asking them to choose four others by affinity. Five of the six assembled the relays while the sixth supplied them with the components. After having assembled a relay, it was placed in a hole located at the level of the worker's right hand. It went down a slide that activated a system for registering it and the time between each relay. This system, which made a click for each relay registered, was used to set wages. The group was separated in the test room from other wage-earners on assembly for 270 weeks, a period divided into 24 phases, a change being made during each phase (*cf.* Table 2). Before each change, the women were asked to come to the supervisor's (Pennock's) office where they were told about the new conditions and asked to continue working as usual without paying attention to the change. Observers were constantly present to gather information, both objective (about timetables, breaks, types of relays, the number of relays produced, the quantity of defective items...) and subjective (*e.g.*, participants' and observers' comments) (*cf.* Table 2).

During the first phase, the women stayed in their department so that researchers could gauge their individual output. They were then placed in a work group and moved to the test room. Official policy was to tolerate conversations in the test room. Starting with the third phase, the pay system used in the rest of the

Table 2:
The first relay assembly experiment

Phase	Changes made	Period (1927-1929)	Production (relays per week)
1	Normal conditions as in the department	25 April – 10 May 1927	2400
2	The test room + work in a group	10 May – 11 June	2400
3	Financial Incentives based on the group's work	13 June – 6 August	2500
4	Two 5-minute breaks	8 August – 10 September	Increase
5	Two 10-minute breaks	12 September – 8 October	Sharp rise
6	Six 5-minute breaks	10 October – 5 November	2400
7	Two breaks (15 and 10 minutes) + snacks	7 November 1927 – 21 January 1928	2500
8	Same conditions as in phase 7, but the workday ended at 4:30 p.m. (instead of 5:00 p.m.)	23 January – 10 March	Sharp rise
9	Same conditions as in phase 7, but the workday ended at 4:00 p.m.	12 March – 7 April	2900
10	Same conditions as in phase 7, but the workday ended at 5:00 p.m.	9 April – 30 June	2800
11	Same conditions as in phase 7, but without work on Saturday morning	2 July – 1 September	Stable
12	Return to the conditions of phase 3: all benefits eliminated	3 September – 24 November	2900
13	Same conditions as in phase 7 but without snacks	24 November 1928 – 29 June 1929	3000

Roethlisberger and Dickson (1939) reported only thirteen phases for this experiment, since the findings in later phases were of such poor quality that they were not methodically recorded.

plant was modified for the women in the test room. Their wages were measured by the group's average output (and not by the average output of the approximately hundred workers in the department), the goal being to encourage participants to cooperate fully and seriously in the experiment. During phases 4-7, short breaks were introduced when output decreased (end of the morning and start of the afternoon). This decrease, it was observed, was related to hunger, since the women skipped a meal. For this reason, the company offered snacks (fruit, sandwiches, soup, etc.) during the breaks in phases 7-12. Once the breaks were introduced, the test room's results were so convincing that the staff allowed breaks in the whole assembly department as of February 1928. During phases 8, 9 and 11, worktime was shortened. During the tenth phase, Western Electric's staff, surprised by the results, called in two academics: Clair Turner, an ergonomist from MIT, and Elton Mayo, a psychosociologist from Harvard. During the eleventh phase, Saturday morning work was suspended following an agreement with the participants. For them not to be financially penalized, the wages for that morning would still be paid. Despite this good news, production did not budge. During the twelfth phase, researchers took away the previously granted benefits (breaks, snacks, shorter hours). Nonetheless, productivity increased, and this increase lasted. In effect, informal arrangements were soon made during this phase to maintain the group's output: if one woman worked more slowly, another (usually her neighbor) would increase her pace of work to maintain benefits.

The staff gathered the women's opinions in order to know what had motivated them the most:⁽³⁾ working in a small group; management's friendliness; the pay system; the novelty of the situation; the participant's interest in the experiment; or the attention that the staff and researchers paid to the workers. Turner (1933), while arguing in favor of the impact of financial incentives on the group's productivity, considered that it was but one among other factors. In contrast, Roethlisberger and Dickson (1939) concluded that the staff's friendliness toward the workers fully explained these positive findings.

From the fourteenth phase onwards, the quality of findings deteriorated, and the results were no longer analyzed. The workers cooperated less and less with each other. In 1932, the experiment came to an end, leaving many gray zones behind.

CRITIQUE: Critics of this experiment have claimed that the increase in productivity was questionable, that management was authoritarian and that the dedication of these women workers was far from disinterested. Let us examine these three points.

The discussion about whether productivity had increased and about the size of any increase has been heated. Some authors have statistically shown that production did not rise and that there was, therefore, no Hawthorne effect (FRANKE & KAUL 1978, PITCHER

1981, JOHN 1992). In a similar vein, Kompier (2006) has pointed out that, during the twelfth phase, the hourly production rates of four of the five workers definitely fell. This means that average hourly production and total weekly production had been confused. He has also pointed out another anomaly: Roethlisberger and Dickson (1939) and Roethlisberger (1941) do not present the same data.

For others, the increase in output was very small and could be set down to learning (PITCHER 1981, BERT 1999) or standardization of the relays (LECUYER 1988 & 1994, GILLESPIE 1991). The women working in the test room only assembled five sorts of relays, unlike in the assembly department (where 150 different models meant putting together from 26 to 52 parts). The increased output might have followed from the adoption of a "strategy" by wage-earners, since they had been informed about each change prior to its introduction and about the expected results. The women were also able to control the regularity of their output through the sound made by the recording machine (PARSONS 1974, CLAUS 2007). Gillespie (1991) has argued that the workers chose the most favorable changes (pauses and snacks) to increase their output, a conclusion shared by Lecuyer (1994), who has observed that the women had set up a rotation system in which each of them, in turn, was to achieve the daily quota of relays.

Interpretations of interactions in the test room have raised doubts about the sympathetic atmosphere there and management's friendliness (CAREY 1967, BRAMEL & FRIEND 1981). During the third phase, four of the six workers were chided for their lack of "*sincere cooperation*" and their chatting, even though chatting was officially tolerated. During such distractions, productivity fell off significantly. This led to restoring an authoritarian management that forbade chatting; and two of the workers were ousted from the experiment. Mayo (1945) mentioned one dismissal, while the other woman left the test owing to her anemia and not because she had chatted too much. Another reason that might have come into play: the two had the lowest productivity, and management wanted to replace them (CAREY 1967, WALTER-BUSCH 1990, SARIN 2003). Their replacements were two "zealous" workers, one of whom was the fastest on assembly. She was her family's breadwinner and urged the group day after day to make more relays. She assumed the authoritarian role of leader; and her agreement had to be obtained for absences, since the replacement's lack of experience would automatically lower output and, therefore, the bonus. Thanks to the increase in production under this worker's leadership, management could become friendly again (CAREY 1967). In other words, positive results make management friendly — not the reverse, as is often said.

Did financial incentives significantly stimulate productivity? Two workers (Theresa Layman and Wanda Blazejack) and an observer (Donald Chipman) in the Hawthorne experiment were interviewed years later (Parsons 1974 & Greenwood *et al.* 1983). All three stated that financial incentives accounted for the

⁽³⁾ Miss Rousseau, on staff at the Hawthorne plant, conducted 124 nondirective interviews in 1931 and 1932 (WALTER-BUSCH 1990).

increase in production, since the workers could thus double their pay.

Had there been a Hawthorne effect, then the work group's productivity should have increased with each change in the conditions made during the experiment. Upon scrutiny of the results however, productivity increased very little or even decreased when changes were introduced, even when taking into account a hypothetical lag between cause and effect. In contrast, this increase, when it did occur, can be set down to Taylorist factors such as the standardization of relays, managerial discipline and employees' motivation to earn more pay.

Minimizing the importance of financial incentives compared with social factors became a leitmotif both for the staff and for the Harvard research team. For this reason, a "second relay assembly test room" experiment was undertaken.

The second relay assembly experiment (August 1928 – March 1929)

Five new workers were appointed by management for this experiment; they stayed in the assembly department; and working conditions were the same as in the rest of the factory (*cf.* Table 3).

No change was made during the first phase, a period for gauging the average productivity of the five women. During the second phase, researchers explained to them that the pay system would now be based on their group performance (instead of the performance of the whole department). Production immediately jumped 12.6%. This system aroused the jealousy of other workers in the department, who wanted the same pay. During the third phase, under pressure from Pennock, researchers reintroduced the former pay system in order to soothe tensions; and the output from the five workers fell 16.4%. Western Electric then stopped the experiment.

CRITIQUE: What to conclude from this aborted experiment? Even though it demonstrated the effect of pay on productivity, Roethlisberger and Dickson (1939) considered that this effect was limited due to the experiment's brevity and the fluctuating productivity of each worker (e.g. R3: 117.4% and then 64.7%) and from one worker to the next. For them, two factors explained the increase in production:

- Competition between the first and second relay assembly experiments. The women wanted to do as well as those in the first experiment. This interpretation has no serious grounds. It was based on an informal

discussion with the woman who supplied the parts in the first experiment but who did not have a full part in the second. Furthermore, this effect due to competition was not observed during the third phase, when the employees reduced their output to express their discontent.

- The fear of dismissal during hard times in the economy. Doubting this explanation, Gillespie (1991) thought that the 1929 crash had no impact on the experiment. Aware of the importance of this experiment for management, the women knew that they could not be laid off.

Despite Roethlisberger and Dickson's explanations, we are forced to admit that wages were the overriding factor in productivity. As proof, Carey (1967) noted that financial incentives produced, in five weeks, the same increase in production that took nine months in the first relay assembly experiment.

Unable to complete their experiment, researchers designed a new one in a calmer setting: the "mica-splitting test room".

The mica-splitting experiment (August 1928 – September 1930)

In the mica-splitting experiment, conditions were the same as in the first (breaks, snacks, shorter hours, etc.) and second (pay incentives) relay assembly experiments. Researchers added piece rate wages, overtime and work on Sunday with higher wages. Their goal was to show that the breaks and a reduction of worktime would but moderately affect production.

Management selected two women workers who then choose three others by affinity. This group of five was then moved to the test room. Splitting and calibrating mica chips was a meticulous job. The research, which lasted 107 weeks, had five phases (*cf.* Table 4). The phases were deliberately longer than in the preceding experiments, the aim being to measure the impact of changes over time. Each woman's production and opinions were recorded (*cf.* Table 4).

The first phase gauged the output for each worker while fostering cooperation between the five. A meeting was organized prior to the movement to the test room in order to explain the objectives of the research and to ask the women to work normally. On this occasion, they were offered to put in overtime. All were in favor of this change, introduced during the second phase. Chatting was tolerated, and the atmosphere was friendly. During the third phase, breaks and work on Sunday were introduced, and immediately accepted

Phase	Characteristics	Period (1929)	Relays produced
1	Normal conditions	27 August – 29 September	1634 (100%)
2	Pay based on the group's output	26 November – 26 January	1840 (112.6%)
3	The former pay system	27 January – 14 March	1366 (83.6%)

<i>Phase</i>	<i>Changes made</i>	<i>Period (1928-1930)</i>	<i>Output %</i>
1	Normal conditions in the department	27 August – 20 October 1928	100%
2	Move to the test room: overtime (no breaks)	22 October – 24 November	115.6%
3	Overtime; two 10-minute breaks with snacks; Sunday work	26 November 1928 – 15 June 1929	115.6%
4	No overtime; two 10-minute breaks with snacks; Sunday work	17 June 1929 – 17 May 1930	104.4%
5	8 hours per day, 5 days a week; two 10-minute breaks with snacks; but no Sunday work	19 May – 13 September	104.4%

by all. After a few months however, the women took a strong disliking to Sunday work despite the higher wages. During the fourth phase, overtime was done away with, since part of the mica-splitting had been transferred to a Western Electric factory in New Jersey. In August 1929, the rumor was circulating that the whole mica department would be moved to the New Jersey plant. On 16 September 1929, the women in the mica department were all reassigned to other services. However the test room experiment was spared, but overtime and Sunday work were eliminated. This reduction in worktime was accepted. The women, with resignation, suspected that the experiment would soon come to an end.

CRITIQUE: What to make of this experiment? For two years, output did increase but variably according to the figures cited by the authors: 120% for all phases according to Pennock (1930) but 115.6% during the second and third phases for Roethlisberger and Dickson (1939) before falling to 104.4% at the end of the experiment. According to Roethlisberger and Dickson, the increase in production was to be set down not to the workers' financial motivations but to the introduction of breaks, while the decrease as of the fourth phase could be explained by the fear of dismissals following the rumor about the mica department.

Although Roethlisberger and Dickson (1939) initially wanted to minimize financial incentives, they forgot that, according to their own explanation, productivity started falling during the fourth phase — when overtime was eliminated, a change that led to a loss of wages. This demonstrated, once again, the significance of pay in the commitment of workers to doing their jobs.

Pennock and the staff had very pragmatic objectives. They wanted to show that the experiment was a success and that the breaks had a positive impact. Western Electric's management was concentrating on factors that it could manage at little cost. For this reason, it fully approved the breaks since, unlike financial incentives, introducing breaks entailed scant, if any, extra costs.

Individual interviews with workers (September 1928 – early 1931)

To complete the preceding experiments and understand the impact of a sympathetic management on productivity, an "interviewing program" was set up in the factory under the joint direction of Whitehead, a researcher, and Wright, a staff member. The interviews did not initially yield much information. The questions were precise (e.g. How does your supervisor treat you? How do you feel about your working conditions?); and the interviewers (foremen or staff members) were not trained for this assignment.

In July 1929, a new series of less directive interviews, each lasting one and a half hours on the average, was begun that allowed interviewees to freely voice their opinions (with the guarantee of anonymity). In all, a wide range of information, including approximately 40,000 grievances, was garnered from 21,126 interviews. A content analysis identified 74 themes, which were then condensed into 37 categories. Table 5 presents the principal findings.

<i>Rank</i>	<i>Theme</i>	<i>Frequency</i>
1	Pay	6816
2	Cloakrooms	3540
3	Health and safety	3208
4	Direct supervision	2737
5	Overtime	2273
6	Toilets	2044
7	Lighting	1689
8	Ventilation	1524
9	Output quotas (<i>bogey</i>)	1384
10	Employment	1318

Source: Roethlisberger & Dickson (1939, p. 232)

CRITIQUE: According to the findings, pay was the most frequently mentioned theme in the interviews. However management attached little importance to criticisms, since it felt that the individual interviews merely echoed personal grievances. Why was it so obstinate? Why did management ignore this theme, so obviously important given its rank? The reason had to do with its proclaimed goal: show that a paternalistic, sympathetic management was the single source of motivation for the personnel — in other words, provide proof of the Hawthorne effect.

To gauge the group dimension, six workers were subjected to direct observation in May 1931. Two research assistants interviewed each one and then observed their activities and group interactions in the workshop for several weeks. However researchers realized that worker behavior could not be understood if the informal organization were overlooked that imposes norms and regulates group activities. For this reason, this observation period came to an end in 1931 in order to make room for a broader program: the “*banking wiring observation room*” experiment.

The bank wiring room experiments (June 1931 – February 1933)

Mayo (1945) assigned this experiment on the assembly of telephone switching equipment to an ethnologist from Harvard, Lloyd Warner. A new test room was installed for observing social interactions within a group of fourteen skilled workers (June 1931 – May 1932): nine assemblers (W1-W9), three welders (S1, S2 and S3 who was replaced with S4), two quality controllers (I1 and I2, the latter replaced after two weeks with I3). These workers, chosen for their strength, were observed for more than six months by someone who remained as “invisible” as possible and had instructions to never intervene and to take note of any words or deeds related to social relations within the group and its informal organization. In parallel, an interviewer conducted interviews for knowing the participants better (e.g. their family situation, social life, etc.). The room was organized such that working conditions, in particular the pay system, were identical to those in the department.

The workers had to reach the “bogey”, a quota set by management. Above this quota, they were paid a piece rate. Since the supervisor was not constantly in the room, the group enjoyed a degree of autonomy. Two informal subgroups formed: on the one hand, W1, W2, W3, W4, S1 and I1, and on the other hand, W6, W7, W8, W9 and S4. W5, S2 and I3 did not belong to either subgroup. An informal parallel organization spontaneously arose with its leaders, interests, production standards and regulations. No improvement was observed in productivity, even though the workers obviously could have produced many more units (15-20%) without much more effort and would have been paid for the units produced above the quota (ROJOT 2005). The workers seemed to be completely indifferent to financial incentives. According to them, increasing productivity would spur management to increase the bogey.

An informal group process regulated worker production: those who failed to reach the quota were said to be profiteering (the assemblers W1, W8 and W9) and those who overshot the quota were called bootlickers (W2 and W6). This social climate usually forced the profiteer or bootlicker to leave the experiment. Under an informal code of honor, members were never to discredit another member or to “snitch” on the group to management, lest they be physically punished. The two subgroups respected each other but also regularly came into conflict for absurd reasons (such as closing a window opened by a member of the other subgroup). However they stuck together opposite nonmembers, such as supervisors, foremen or the person who supplied parts (whom they called Goofy).

The experiment was officially stopped on 19 May 1932 because of the slack work done by the participants, but it was unofficially pursued till 8 February 1933. Five of the fourteen workers were fired and replaced with others whose output was much lower than their predecessors; but the researchers did not take their results into account when analyzing the data or drawing conclusions.

CRITIQUE: This experiment raises problems as to its scientific validity. The results, since they deteriorated over time, were not recorded by researchers. Once again, we have reasons for doubting the Hawthorne effect. The facts that have just been presented show that, for lack of any legal or formal authority within a group, informal subgroups form in its stead. The major lesson to draw from this experiment is the impossibility of understanding worker behaviors without taking under consideration the group’s informal organization, which imposed restrictions on output and resisted changes.

Conclusion

This article has presented the research that, conducted at Western Electric’s Hawthorne Works over a period of nearly ten years, claimed to have discovered the well-known Hawthorne effect, *i.e.*, improving human relations in a firm leads to better economic performance. In fact, the phrase “Hawthorne effect” has been wrongly attributed to Elton Mayo, who never used it. It was forged by Roethlisberger alone (SARIN 2003, KOMPIER 2006). What role did Mayo actually play? This latecomer to the experiments (at the time of the individual interviews) limited his role to commenting the reports about the experiments and making them known. According to Lecuyer (1994, p. 105), Mayo “*turned down Pennock’s offer for him to direct the program of interviews with all workers in the factory, but he would suggest to be paid fees as a consultant and to have his expenses reimbursed*”. Bruce and Nyland (2011), more critical, thought that Mayo merely lent his name as a faculty member of Harvard University to legitimate the experiments.

In effect, the experiments conducted at Hawthorne came out of a partnership between Western Electric and Harvard, two highly credible institutions in American society. Harvard wanted firms to open their doors to its researchers so as to eventually amplify its reputation, while the factory officially wanted to provide a human

image of paternalistic management.⁽⁴⁾ However the unofficial reasons were more politically motivated: curtail protest movements (After all, four million American workers went out on strike against their employers in 1919), weaken workers' interest in alternatives such as socialism and Marxism, and keep the personnel from joining a union (O'CONNOR 1999). With regard to the last point, Western Electric devoted, between 1933 and 1936, \$25,825 to spying on unionized workers (HASSARD 2012).

Several questions have been left hanging that force us to have doubts about any Hawthorne effect. The researchers from Harvard did not take part in the Western Electric experiments before April 1928, a year after the start of the first relay assembly experiment. Besides, the final report by Roethlisberger and Dickson (1939), which contained the results, was written ten years after the experiments. Furthermore, given the limited size of the samples, it is impossible to statistically process the results or to generalize the conclusions, even more so since the results that did not meet up to expectations were omitted from the analysis. Although there was an increase in productivity, it was moderate and did not, in any case, come from improved human relations. It could be fully set down to managerial discipline and financial incentives.

Nevertheless, something did happen at Hawthorne. What effects do the experiments performed at Western Electric actually bring to light? Though undertaken to undermine the foundations of scientific management, these experiments ended up proving the effectiveness of this Taylorism: piece rate wages, discipline, standardization. In fact, several decades earlier, Taylor had already conducted studies that drew attention to breaks and shorter hours as ways to reduce fatigue (FRIEDMANN 1946, BRUCE & NYLAND 2011).

The Hawthorne effect is, therefore, quite clearly a myth that, constructed *ex post*, has lasted and still survives in textbooks, owing to the negligence of scholars who quote the experiments at Western Electric without having consulted the original data (PARSONS 1974, RICE 1992).

⁽⁴⁾ An anecdote, reported by Hassard (2012), clearly evinces the hypocrisy of Western Electric's management, who systematically cut off heating in the toilets during the winter, and ventilation during the summer, so that workers would return more quickly to their stations!

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From paternalism to “patronhumanism”

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Whether in the popular press or academic literature, paternalism is often presented like a pernicious, backward form of governance. On the basis of two antagonisms that underlie it, a less manichean approach is proposed. In the original form of paternalism, traditionalism turned out to be at the service of progressivism. Afterwards, torn between the need to organize the employee's relationship of subordination and the fair recognition of the rights and freedoms of everyone, paternalism evolved toward a new equilibrium, a neopaternalism that, described as “patronhumanism”, was strongly influenced by humanist values.

In 2017, an article in *Le Monde* stated that an employer offering pastry to his employees was an act that signaled his determination to manipulate them, treat them like children and cunningly purchase “social peace”.⁽¹⁾ According to the journalist,⁽²⁾ the intent was to “restore a paternalistic dynamics” (word-dropping — like name-dropping) in the bigger picture of the class struggle and an unresolved Oedipus complex among employees, too naive to deal with this deceitful trick. Reading this “tract” in this prestigious newspaper brought several questions to mind. How can employers be so glibly suspected of such vile intentions? Do employees alone have a heart? Is vindictiveness all French entrepreneurs can expect?

The word “paternalism” appeared for the first time in the title of an article in the *Chicago Times* on 11 June 1881. The French dictionary *Larousse* has defined it as “a conception whereby the relations between employers and workers ought to be governed by the rules of family life, characterized by reciprocal feelings, authority and respect”. But a second acceptance has been added, namely: a “*comportment consisting of maintaining a relation of dependency or subordination while tinting it with an affective value like family relations*”. The contrast between these two definitions sheds light on the antagonism underlying the concept. Whereas the first meaning has neutral or even positive connotations (reciprocal feelings, respect), the second has a much more negative lexical field. It presents an unbalanced relationship (dependency, subordination) tainted with deceit, since the manipulation of feelings and family values seems to be a bait and a justification of this

inequality. When drafting this definition, the dictionary's editors were apparently faced with the paradox of paternalism: a philosophy initially based on devout feelings but that has come to be accused of all ills.

Some pundits have, in fact, not hesitated to liken paternalism to a form of domination by a social class (NEWBY *et al.* 1978), a “*neo-feudalism*” (KOLBOOM 1984), a justification of unequal labor relations (ROBERTS 1978), an employer's strategy for making wage-earners dependent (MORRIS & SMYTH 1989), a “*moral police*” (MILL 1859 §152), an obstruction to individual freedom (OGIEN 2007), a “*bourgeois neotraditionalism*” (KOLBOOM 1984) and even as something disguised in the foul garb of masculinity (KERFOOT & KNIGHTS 1993).

Despite these precedents, could we not imagine a less manichean approach to this phenomenon? A few authors have cleared the way by reminding us that paternalism originally enjoyed strong support from workers (PERROT 1979) and came from “*sincere generosity*” (HATZFELD 1971), a coming together “*in the same feeling of affection*” (MELUCCI 1974) and “*a philanthropical willingness to fight against the extreme poverty that affected workers and their families*” (DOS SANTOS 2014). For Gueslin (1992), it sprung from “*good intentions on the employer's part*”, “*a strong, deeply rooted, personal motivation*” and “*the idea of a mission to be filled*”; and it “*would be erroneous [...] to completely deny this*”. Some studies have even seen paternalism as the major factor related to a high level of satisfaction at work (UHL-BIEN *et al.* 1990) and as a competitive advantage for family-run companies (ALLOUCHE & AMANN 1998, VILLÉGER 2016). Fleming (2005, p. 486) has gone so far as to evoke the heretical idea that paternalism might have several positive aspects and merit a less dualistic theorization. However few studies in the managerial sciences have yet followed in this track. This article seeks to make up for this.

⁽¹⁾ This article, including any quotations from French sources, has been translated from French by Noal Mellott (Omaha Beach, France). The translation into English has, with the editor's approval, completed a few bibliographical references. All websites were consulted in August 2020.

⁽²⁾ SANTOLARIA N. (2017) “Management: la technique de la chouquette”, *Le Monde*, 25 January.

The dualistic view of paternalism apparently stems from the antagonisms underlying it. With regard to this phenomenon, traditionalism turns out to have borne a modernity at the service of progress. This “*very politically incorrect*” idea is, however, scientifically validated according to Le Goff (2012), who has stated with satisfaction that the work of historians of the law has made the “*unilateral and activist*” approach to the formation of labor law yield to a “*more settled, calm vision that seeks to emphasize the complexity of the process [...] and the plurality of the parties involved*”. In like vein, Kolboom (1984) has thought that it would be false to attach to paternalism “*the widespread image of a petrified Malthusian conservatism*”; on the contrary, it should be “*seen as a factor both of traditionalism and, too, of social and economic progress*”. Paternalism should not, he added, be considered to be the “*residue of a pre-industrial past*” but rather the “*expression of a new type of social relations [...] with the function of correcting [...] the disequilibrium caused by industrialization*”. So, my first effort will be to describe, beyond its traditionalist aspects, the original paternalism that, out of a spirit of progress, sought to improve the condition of the working classes and was an operational response to the observation of a widening social gap.

A second antagonism is related to the complexity of the wage-earner’s relation to work. The right to a job necessarily reflects a dialectics expressing “*simultaneously the system for exploiting people and the means for limiting its severity and fighting against it*” (LYON-CAEN 2004, p. 56). By accepting the employee’s subordination to his employer, this right recognized a concrete inequality in society; but in parallel, it could not (and did not want to) leave hold of the abstract idea of equality advocated by the French Civil Code. For instance, paternalism and labor law both sought, each in its domain, to respond to an apparent contradiction: how to see to the freedom and equality of everyone in a relation based on subordination? As Radé (2012) has shown, labor law has partly solved this dilemma by gradually moving from the idea of a deprivation of freedom (age limits, regulated working hours, etc.), which restricted the individual’s capacity for self-determination, to the idea of expanding rights (the right to health, to rest, etc.), a work of humanism. The second part of this article examines the effect of reversing this paradigm in the case of paternalism and focuses on a neopaternalism’s humanism, which we might call *patronhumanisme*.

Paternalism’s values and intents at the origin: A multidimensional progressivism

In his principles of political economy, Gide (1931) argued: “*We must be fair with employers [and recognize] that most of the reforms introduced through labor legislation or from labor union demands were, at first, undertaken at employers’ instigation.*” At the origin, paternalism was related to a political, religious and social form of progressivism.

Paternalism and religious progressivism

Starting in the late 18th century, social and political disturbances were rife in France. Eleven constitutional systems succeeded each other from 1793 to 1875. The Napoleonic wars and civil warfare had major demographic effects. Most medical, social and educational installations were faltering. Deadly epidemics were common. The rural exodus made people even more vulnerable. The government did not seem to be stable, reliable or credible enough to ensure social progress.

Voices arose among Christian intellectuals to protest the destitution of workers and peasants. In 1822, Abbot Lowenbruck founded the Société de Saint Joseph, the first charity for workers. In the wake of this trend, authors like Fodéré (1825), Gérando (1826) and De Villeneuve-Bargemont (1834) tried to make public opinion aware of the curse of poverty, but few listened to their voices. Catholic relief associations did not attract much of a following (DUROSELLE 1951).⁽³⁾

The year 1871 marked a turning point with the foundation of the Oeuvre des Cercles Catholiques d’Ouvriers at the instigation of Albert de Mun, René de La Tour du Pin and Léon Harmel. These three men then helped set up the Fribourg Union (or Catholic Union of Social and Economic Studies, 1884), which based its work on passages drawn from the Pope Leon XIII’s “Rights and duties of capital and labor” (Rerum novarum, 1891). This encyclical laid the grounds of social Catholicism, a reformist branch of the Church that sought to reconcile power and virtue. It condemned the “misery and poverty that unfairly weighs down most of the working class”, criticized the excesses of capitalism and declared that employers should respect workers’ “human dignity”. It was thus forbidden to assign workers tasks beyond their strength or not in line with their age or sex. Work was to be paid a “fair wage” since “to defraud anyone of wages that are his due is a great crime which cries to the avenging anger of Heaven”. Finally, the encyclical urged workers to protect their interests by forming unions.

While de Mun and de La Tour du Pin were policymakers, Harmel would try to turn theory into practice in the firm he headed. His workers benefitted from a savings fund as of 1840, interest-free loans in 1842, a mutual aid society in 1846, schools in 1860, factory councils in 1883 (in which elected workers could take part in steering the company), a “union house”, housing, a theater, a library, etc. Paternalism was born. In his will, Harmel’s father wrote to his son, “Love our workers, they were my children. Assume my paternity, and continue to bear them toward God and to be right by them.” Applying his father’s precepts, Harmel was in 1895 at the origin of the presentation of a report under the title “The legitimate demands of workers in relation to the Church’s orientations in Rerum Novarum”.⁽⁴⁾

⁽³⁾ The “*sociétés catholiques de secours mutuels*” developed by Armand de Melin and the “*patronat social catholique*” at the initiative of Auguste Cochin.

⁽⁴⁾ Report presented by Henri Savatier at the Congress of the Tertiaires de Saint François in Limoges (WAQUET 2012).

Following Léon Harmel, paternalistic employers adopted the Church's social doctrine. They felt vested with a moral mission, which they assumed with goodwill and conviction, namely: improve the social welfare of the underprivileged classes. As De Bry (2008) has reminded us, the paternalists who headed companies represented, at the time, the left wing of employers; and other employers and public opinion saw them as being progressives. For example, Jean-Baptiste Godin (1871), whose work at the Familistère was said to be the "zenith of social progress in companies" (MINCHELLA 2017), was the archetype of this ideological pluralism. He referred to Catholicism, socialism, Taylorism and paternalism without seeing any contradiction therein.⁽⁵⁾ Indeed, these philosophies do not operate at the same level: the first is a religious philosophy; the second, a political philosophy; the third refers to a way of organizing production; and paternalism, to a form of corporate governance.

Later, Vichy France would exploit aspects of this paternalistic tradition, an action that, unfortunately, strongly distorted its image. As Spina (2017) has pointed out however, paternalistic employers played a major role alongside the French Resistance. He cited the example of the Peugeot family, who was deeply involved in the Resistance to German occupation. The family evacuated persons who refused a stint in the Compulsory Work Service (STO: Service du Travail Obligatoire) to its farms and had crops sowed on its golf course to feed those who had to go underground (the Maquis). Spina also mentioned the Michelin family who opposed Vichy and refused agreements with German firms. Marcel Michelin, the founder's son, died in deportation. Jean-Luc Michelin stood out as a leader of one of the few intelligence networks formed within the Reich. The company urged workers to leave the factory for the Maquis, while continuing to pay their wages and help their families. Furthermore, fewer than 5% of the workers at Michelin's plants left for the STO, one of the lowest rates in big firms in France.

Paternalism and social progressivism

In 1864, Le Play described the socioeconomic situation in France as follows: "We see people grouping around new manufacturing machines who are separated from their families, whom their new employers do not know, who lack decent housing, schools and churches, who are deprived of the physical and moral conditions that used to be deemed indispensable for the existence of a civilized people."

Full of conviction, paternalistic employers took the place of the failing government and decided to take charge of the task of building decent housing for accommodating workers and reuniting them with their families. Beyond bringing families together and

⁽⁵⁾ Godin often mentioned Frederick Taylor's work (REY 1982), which, at the time, was considered to be progressive even, among workers, owing to its scientific quality and the ideal of justice, since it tied wages to results.

providing the comfort of decent accommodations, these actions allowed for the social mobility of workers who, till then, could not even imagine home ownership. In some mining towns for example, the employer owned the houses, but workers were housed for free. Running water and electricity, scarce at the time, were also supplied for free. Shopping could be done at the company store at prices much lower than in outside businesses. Contrary to what is sometimes implied, this paternalistic system let workers choose whether or not to benefit from company housing. In addition, they received an allowance if they chose accommodations other than those provided by the company.

The construction of these housing developments occurred at a time of rising concern about hygiene and safety. During the debate in parliament on the bill of law about work-related accidents in 1898, paternalistic employers fervently argued for the recognition of occupational hazards (EWALD 1986). They set up medical services in factories, cloakrooms with showers, "preventoriums" and employer funds for worker healthcare. At the end of a worker's career, a "departure allowance" was paid — long before an official retirement system was set up. Retirement homes were opened for workers; and survivors' benefits, paid to widows. After having housed their employees, Cognacq-Jay, the spouses who directed a big department store (La Samaritaine) in Paris, opened a retirement home and maternity for their employees. These paternalistic employers conducted actions for family and child protection services. They tried to improve the poor sanitary conditions experienced by pregnant women and fought against the high infant mortality rate (coverage of medical fees, medical consultations for infants, etc.). They helped lighten the family's burden by paying wages during maternity leaves, funding nurseries, providing family allocations, reducing the rent paid by couples with children, and so forth. Before the Ferry acts, at a time when work was permitted as of the age of ten, these employers were conditioning social benefits to the enrollment of children in schools, thus promoting education and helping to emancipate a whole generation. They opened nurseries and schools for free that, unlike ordinary schools, offered conditions compatible with the parents' working hours. The Michelin schools enrolled more than 6000 pupils.

Paternalistic charities were formed earlier than the work councils (or company committees), which, after their creation in 1945, would assume many of the activities sponsored by these charities and organize cultural, educational and leisure activities for free. Children could attend the company's summer camps; and families, spend time in the company's vacation centers. Outdoor centers were set up for the personnel's children when they were not in school. This paternalistic philosophy even motivated some leaders, like Paul Ricard (head of the family firm with the same name), to offer their employees a fifth week of vacation with pay several years before this became a matter of law in 1981.

Besides worker welfare, paternalism sought to emancipate workers (DE BRY 2008). Its tenets were

“very far from treating workers like children” (DOS SANTOS 2014). It sought to “lead unawares workers to the point of doing without support” (VERON 1966). In psychoanalysis, the father is the figure who destroys the fusional bond between mother and child, and enables his offspring to grow up and assume themselves as egos (FREUD 1900). In sociology too, the father has traditionally had a socializing function. In addition to his part in separating child and mother, he has a function of authority and openness toward the world (HÉRITIER 1996).

Consistent with this idea of emancipation, paternalistic policies favoring ownership did not just concern home-owning but also reached into the economic realm. Paternalists were the first to open the capital of their companies and set up wage-earner shareholding plans (HIRIGOYEN & COURET 1990). Before any law on this, they created profit-sharing schemes to establish a relation between employees and the company's success as at Leclair, a Parisian paint company, in 1842, at the Loire Mining Company in 1848, at Michelin in 1898 and, by 1901, at more than 120 paternalistic firms (JORDA 2009). The savings funds set up by employers also advanced emancipation and social mobility.

Paternalism's achievements amounted to a major cost for these companies, even though this has seldom been pointed out. The houses paid by the employer were, for example, resold to employees without any profit and with a long-term, low-interest loan. This process, which required and immobilized an enormous capital, was not very profitable for employers (HOMMEL 2006). At Creusot, paternalistic actions amounted to 5-10% of payroll costs (BEAUD 1990); and at the Longwy steelworks, 13% of payroll costs and 46-68% of dividends (MOINE 1989). The average cost of paternalistic services in 1927 has been estimated at 10% of payroll (DAVIET 1997). The stereotype of the heartless boss motivated only by greed for more money seems very far from being true.

A final point: the promotion of a meritocracy struck a responsive chord among workers, since it opened unexpected possibilities for occupational and social mobility. As precursors of the contemporary concept of collective intelligence (LÉVY 1994), paternalistic employers recognized and valued their employees' accumulation of skills and qualifications. Godin (1871) insisted on taking workers' advice into account, claiming that, thanks to their everyday experience in workshops, they were best placed to make proposals that would be on the mark about the mill's operations. He urged them to form worker councils and become involved in the firm by assuming responsibilities and taking initiatives (DOS SANTOS 2014). François Michelin adopted as his own the creed of paying close attention to what workers have to say (MICHELIN et al. 1998). He urged employees to imagine potential innovations, whether organizational or technical. The Radial tire, the company's flagship product, was invented thanks to a new process discovered by a worker, Marius Mignol.

Paternalism's value and intents in the 21st century: Freedom, solidarity, responsibility

What about paternalism in the 21st century? According to several authors, paternalism is not an outdated managerial technique (FLEMING 2005) and can be made relevant for contemporary systems of management (GREENE *et al.* 2001, KERFOOT & KNIGHTS 1993, KNIGHTS & McCABE 2001, THALER & SUNSTEIN 2003, WRAY 1996). Writing on the “*new paternalism*” in 1997, Mead described the modern variant of this philosophy based on humanistic values of solidarity and responsibility. Today, many facets of our paternalistic legacy are considered to be progressive and humanist instead of being seen as an infringement on individual freedom. The benefits provided by company committees (or work councils) are not interpreted as evidence of the employer's determination to insidiously meddle in wage-earners' private lives. The argument no longer works about a contemptuous boss who poses as the benefactor of ignorant wage-earners and facilitates their access to cultural and leisure activities. The doctor in occupational medicine is no longer seen as evidence of management's determination to meddle in the lives of employees and control them.

The strategies for promoting employee loyalty are now appreciated, considered to be favorable to wage-earners, whereas critics of paternalism saw them as a manipulation for restricting the employee's free will.⁽⁶⁾ In broader terms, penal law, which paternalism has shaped (FEINBERG 1986), is seldom considered to be moralizing and fatal to our freedoms. The pejorative connotations associated with paternalism keep employers from laying claim to this tradition. The tension surrounding this topic might, we imagine, be as semantic as conceptual. At first sight, the word “paternalism” seems inappropriate since wage-earners are, obviously, not children. As a consequence, redeeming this tradition means proposing a new word. Analyses of contemporary paternalism lead me to propose “patronhumanism”, which can be defined as a form of corporate governance influenced by humanist values, such as freedom, solidarity and responsibility.

A liberal “patronhumanism”

The idea of total subordination to the pater familias was gradually eroded during the 20th century. The society of the 19th century granted the father figure power in politics, institutions and the family. This power is now mainly relational, defined in relation not to society but to the wife (who becomes a mother) and

⁽⁶⁾ At Google for instance: swimming pools, massages, yoga courses, game rooms, meals available 24 hours a day, childcare services, services for pets, legal services for employees' private affairs, doctors and dentists on call, conferences on art or literature, weekly parties... offered for free — all this reminds us of paternalistic practices even though no reference is made to them. Presented as part of a policy for promoting employee loyalty, this range of services has played well in the media and regularly places Google in the forefront of the firms where it would be nice to work.

children (CASTELIN-MEUNIER 2001). Just like the new father has to earn his legitimacy in the family, the new employer has to earn his entrepreneurial legitimacy. In both cases, the key words are conciliation, the rejection of authoritarianism and the end of the dominant/dominated relationship.

This “new generation” of paternalism fits in with this new relation to authority. During the 20th century, leadership gradually became participatory (BARNARD 1938, BLAKE & MOUTON 1964, MCGREGOR 1960) or democratic (WHITE & LIPPITT 1960). By 1967, Likert was describing paternalism as a style of leadership that places human concerns at the center of managerial preoccupations by giving priority to relational issues over economic interests. He evoked a participatory management, that, in contrast with the authoritarian style, was based on proximity and the strong confidence that parties have in each other (including in big firms).⁽⁷⁾ For Le Goff (2012), paternalistic employers were soon aware of the “dead end of harsh, repressive policies in the firm”. They intelligently “took workers not to be an obstacle to be forcibly overcome, through costly strife, but as a potential to be freed”. As Jorda (2009) has shown, many aspects of the paternalism of the industrial era already corresponded to the modern style of participatory management given the importance of: confidence, respect for the work relationship, social benefits, shared values and a corporate culture, employee loyalty, etc.

However it is Thaler and Sunstein (2003) who have named the new form of management that characterizes contemporary firms: a liberal or “libertarian paternalism”, which they define as a “relatively moderate, flexible, noninvasive version of paternalism, which does not prohibit or restrict anyone’s options. A philosophical approach to governance, public or private, which aims at helping individuals make decisions that improve their lives without harming the freedom of others.”⁽⁸⁾ This style of leadership stems from the idea that the indirect suggestions made to individuals can influence their decisions as much as, or even more effectively than, orders or legal obligations. The paternalistic liberal manager no longer issues strict guidelines. He does not impose, he suggests. He manages with “nudges”, from the verb (to nudge) which literally means pushing people with the finger or elbow to lead them to do something. In other words, he tries to influence individuals so that they make the choices that

⁽⁷⁾ For example, Gérard Mulliez, who founded Auchan Group, has always refused to yield to the siren call of the CAC 40. His argument is that, once a company is listed, management’s primary preoccupation becomes, day in, day out, the price of the firm in the stock market, this instead of a concern for employees, customers and the environment. According to this paternalist, corporate executives have to be interested in people, in and around the firm, before showing an interest in financial results.

⁽⁸⁾ Sunstein’s work strongly interested President Obama, who appointed him to the White House Office of Information and Regulatory Affairs, the keystone of federal regulatory institutions.

he has imagined and deemed good for them and for the firm, while leaving them the possibility of making other choices.⁽⁹⁾

“Patronhumanism” and solidarity

Another characteristic of this neopaternalism is a “solidarity” that is no longer necessarily dictated by the Church. An ethics with a universal, consensual foundation greater than religion had to be proposed, especially in Europe which is more secular than the United States (ACQUIER et al. 2005). This new foundation is humanism; and the grounds of solidarity is the moral obligation not of charity, which weighed on believers, but of humanity, which weighs on each human being.

In legal circles, evidence of this new approach is the current of thought focused on solidarity. To the “acting pity” of religion, Bourgeois (1896) preferred solidarity, a “fraternal bond that obliges all human beings toward each other”. “This ideal of society” has no other choice than to take shape in the field of the law “at the risk, otherwise, of being compared to Christian charity” (AMIÉL 2009, p. 153). Some supporters of this approach have argued for a “contractual solidarism”, considering, like Mazeaud (2012), that it is “useful and fair [that] the values of ethics and solidarity” figure in the law on contracts, the intent being to establish a contractual equilibrium and a “new way of thinking about contracts, as a union of balanced interests, an instrument of loyal cooperation, a work of mutual confidence” (RÉMY 2004). “The contract is less and less perceived as a clash between freely consenting parties, as a compromise between antagonistic, bitterly defended interests. It turns out more and more to be a necessary point of equilibrium, even the basis of a desirable collaboration between the contracting parties” (MESTRE 1986).

We can see this neopaternalistic patronhumanism as the managerial application of solidarity in the field of law. Separated from religion, patronhumanists see the firm as a community whose members maintain balanced relations of solidarism and pursue a common goal. According to Gallenga and Soldani (2015), modern paternalism lets wage-earners rally for a goal and joint interests; and Jorda (2009) talks about cooperation for realizing work in common.

A responsible, humanist neopaternalism

By the start of the 20th century, the academics working on management theory were insisting on the entrepreneur’s responsibility. Writing about the “spirit of capitalism”, Weber (1905) pointed to the need to associate ethical justifications with economic activi-

⁽⁹⁾ For example, to make Americans increase their savings, Thaler and Sunstein (2003) proposed the nudge of automatically opening savings accounts for employees. Each wage-earner is free to put, or not, money on the account. As studies have shown however, the savings rate of wage-earners rises from 20% to 90% when accounts have been automatically opened for them.

ties. In the United States, Bowen's (1953) *Social Responsibilities of the Businessman* argued for solidarity in firms and respect toward workers. In 1954, Drucker's *The Practice of Management* stated that social and entrepreneurial issues cannot be separated from each other. In 1971, the current of Corporate Social Responsibility was born in Harvard Business School: firms were trying to integrate social questions in their management. The concept of limited rationality developed by Simon (1983) fits into this trend since it set less store on employees' economic motivations than on social and cultural factors.

At the start of the 21st century, the concept of corporate social responsibility (CSR) was institutionalized, in particular through the European Commission's "Green paper" (2001), which states: "Being socially responsible means not only fulfilling legal expectations, but also going beyond compliance and investing 'more' in human capital, the environment and relations with stakeholders." Firms are urged to become ethical and have civic concerns. Justice, exemplariness, confidence and respect are to be the guiding values of their actions. As a counterpart to being a depository of financial resources, a firm has to assume a function of moral and ethical regulation.

Attention should be drawn to a few similarities with paternalistic precepts.

For De Bry (2008), the ethical preoccupations of firms do not date from the 21st century but reach back to the era of paternalism: "Paternalism is an avant-garde ethics." The word alone has changed, since the "ethics of this end of century is the paternalism that began in the 1850s". As of 1975, the *Centre des Jeunes Dirigeants* proclaimed that "firms must be social to be economic" and claimed that the concept of a "citizen firm" initially came from employers. Several studies have struck out in this direction. For Le Goff (2012), paternalism recognizes the "employer's responsibility toward workers and their families, a responsibility expanded to all of their existence and, step by step, to all of the surrounding society".

Paternalists were already practicing a form of social management. Loison (2009) has studied the Pechiney Group, a "history of corporate social responsibility from paternalism to sustainable development". This paternalistic firm was among the first to practice CSR like the contemporary firms that try to see to the welfare of their employees. According to big industrialists like Carnegie (1889), entrepreneurs had duties toward the society and do not actually own their wealth: they are but the administrators of it. Their duty is to use it in a worthy, decent way for the common good. During a speech in Gladstone in 1887, Carnegie declared, "I should consider it a disgrace to die a rich man."⁽¹⁰⁾

In their "anthropology of entrepreneurial ethics", Gallenga and Soldani (2015, p. 94) asked whether corporate social responsibility (CSR) is to be seen as a form of neopaternalism: "Just like paternalism delivered

discretionary advantages, firms, due to CSR, provide specific advantages, such as contingency or mutual funds, fringe benefits... [CSR] also plays on the idea of sharing values, emphasizes worker fidelity and loyalty, argues for respect and confidence in relations [...]. It is also a voluntary approach, a form of self-regulation for the firm [...] tinted with morals." Also seeing corporate social responsibility as a new form of paternalism, Boutillier and Fournier (2009) have reminded us that this sort of responsibility continually extends the reach of management's interventions into employees' private lives: the modulation of worktime to take account of the family situation, health prevention work (e.g., incentives to stop smoking), the promotion of car pools, etc. Finally, Hommel (2006) has drawn attention to the "affiliations and continuities" between paternalism and corporate social responsibility. Both are a form of collective action that refers to pragmatism, individual ethics and the conciliation of private interests for the sake of the general interest. As during the era of paternalism, voices (e.g., STIGLER 1971) have railed against private interests coopting issues that should be public.

Both paternalism and corporate social responsibility have a long-term vision with concern for the coming generations (KOIRANEN 2003). Paternalists, often family entrepreneurs, tended to see themselves as "relays passing the baton". Given their priority to keep the firm afloat down through the generations, they supported the idea of "patient capital" — a modern concept closely associated with CSR. In both cases, human considerations override financial ones, whereas "anti-paternalists" mainly emphasize the economic and contractual nature of the relation to a firm (UHL-BIEN et al. 1990).

As Torrès and Jaouen (2008) have shown, the heads of small, paternalistic firms have a local management based on empathy with their employees instead of normative rationality. Their wage-earners are not anonymous to them; they are human beings, persons nearby with whom the entrepreneur has daily company, whose families he knows. In cases when feelings override business, this personal involvement might hasten the firm's decline.⁽¹¹⁾ In an analogy with the Civil Code's references to a benevolent fatherly figure (the "bon père de famille") who is prudent, diligent, attentive and eager to manage wisely the goods and interests entrusted to him, the paternalistic entrepreneur and the patronhumanist are fatherly figures in their firms. They feel responsible for employees, like parents toward their children, not because they consider them to be inferior but because they know that their fortunes are interrelated.

Long before legal obligations were enacted, the governance of paternalistic leaders naturally took account of corporate social responsibility. More than half of the

⁽¹⁰⁾ Andrew Carnegie (1887) *Statement to Gladstone*.

⁽¹¹⁾ The Observatoire de la Santé des Dirigeants de PME at Montpellier University studies the mental workload and stress of employers. Lechat and Torres (2016) have complained about the lack of scientific studies on the psychosocial risks of the self-employed and the absence of an occupational medicine devoted to this category of persons, in particular to the heads of firms.

entrepreneurs in small businesses do not recognize the initialism “CSR”; but, as a study of their managerial practices has shown (POLGE 2008), the large majority of them are following through with CSR principles without knowing it.

As in Walrasian theory, the entrepreneur and his company are fusional. This holds for both paternalists and neopaternalists, whence a heightened feeling of “natural” responsibility for employees. Such employers are, for instance, more reluctant than others to fire wage-earners (PINÇON & PINÇON-CHARLOT 2006). This philosophy sets them at odds with the gung-ho advocates of flexibility and places them in the midst of socially responsible entrepreneurs.

Conclusion

Like paternalists during the 19th century, patronhumanists of the 21st century have moved beyond the obligations imposed by the law. They see the “*worker as a person who cannot be reduced to the force of his labor alone*” (LE GOFF 2012). They try to improve the quality of life at the workplace; and are keenly aware of social and societal issues. However, their engagement is based on solidarity more than charity, on freedom more than authority. All this is conducive to a more equal relationship with employees who deserve to reap the benefits of social progress as human beings instead of dependent subordinates. Nowadays, in a context where the recent executive orders issued by the president of France favor collective bargaining between a management that makes proposals and wage-earners who accept them, the values of the party making proposals are still decisive. They assign to patronhumanists, as to paternalists in the previous era, a decisive role in the dynamics of social progress.

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For a genealogy of paternalism

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Response to A. Villéger's article, "From paternalism to 'patronhumanism'".

Amélie Villéger's article, "From paternalism to 'patronhumanism'", asks us to take a fresh look at an increasingly present current of thought. It traces the origins of "patronhumanism" back to paternalism, its accomplishments and successes. Perspectives are thus opened on the "new world", to borrow the phrase of the President of France elected in 2017. Without trying to reshape with hammer blows the vision of a sometimes idolized past, it is, in my opinion, worthwhile adopting a genealogical view that looks beyond good and evil in order to move away from preconceived ideas.⁽¹⁾

The article recalls the historical setting at the origin of paternalism. What I find significant is that the new industrialists borrowed the model of the 18th-century's enlightened agrarian aristocracy by advancing the same political claim to social utility.⁽²⁾ In both cases, the legitimacy of economic domination was grounded on a concern for the well-being, at first, of peasants and craftsmen, and then of the latter's children or cousins, namely workers — and now of wage-earners. For sure, a Christian (and not just Catholic) ethos was involved, a point that the author has tended to overlook. After all, the HSP (Haute Société Protestante) represented by the families Peugeot, Hottinguer and Dollfuss played a full part in this current of thought. At stake was a clear vision of a stable social order, since the fight against poverty had to be undertaken not just for reasons of Christian charity but also owing to its dangerous political consequences (a point of view also adopted by Tocqueville).

The same concern about social organization and the same focus on wage labor underlaid, it should be pointed out, the utopias of Saint-Simonianism and Fourierism, which proposed political and social alternatives. In the mid-19th century, employers, or part of them (like socialists but with fundamentally different intentions), wanted to recreate a more harmonious organization (for the purpose of order in the case of employers but of equality and emancipation from poverty in the case of socialists) that would create the

conditions for the realization of individuals and the re-organization of society in the new world of industrialization with workers now concentrated in towns (and no longer rural villages). Regulatory institutions had to be set up to succeed the feudal parish system. Paternalism thus arose as a means for locally regulating the social tensions resulting from the shock of industrialization and the metamorphosis of towns of craftsmen and merchants into concentrations of workers. No more than fifty years passed between the ideal city imagined by Ledoux at Arc-et-Senant and the "coron" housing developments with their company stories.

The sudden development of big industry in Great Britain, Germany and France was shattering the Fourierist utopia at a time when this employer paternalism was achieving its first successes in managing labor. This utopian strand of thought was replaced with a much more radical critique. Marxists insisted on the alienation caused by wage labor, some of them going so far as to see in company services for labor a response to the moral bankruptcy of capitalism and the concern for the redemption of bosses tormented by their conscience.

Villéger has borrowed an admirable quotation from G. Lyon-Caen (2004, p. 56): the right to a job was forced to address a dialectics expressing "simultaneously the system for exploiting people and the means for limiting its severity and fighting against it". This makes it clear how, in this state of tension, paternalism sought to strike a balance between humanistic intentions (even before the law imposed obligations) and economic constraints. This tension was described without wishful thinking in Engels' well-known *The Condition of the Working Class in England* (1887), which set employer paternalism in matters of housing in a very different light. Engels showed how housing for wage-earners (often in better conditions than in rural areas at that time) was also a good business for employers. The latter thus reinforced their domination through not only the wage-earning relationship but also their control over housing — a benefit that could be lost in case of dismissal (cf. Zola's *Germinal*).

⁽¹⁾ This article, including quotations from French sources, has been translated from French by Noal Mellott (Omaha Beach, France).

⁽²⁾ Cf. Stendhal (1825) *D'un nouveau complot contre les industriels*.

But why, we must ask, has paternalism in France been discredited for so long? A detour through the history of labor relations in Germany tells the story. At a very early date, the German state imposed by law many of the arrangements that were left up to the willingness of employers in France. Institutionalized and made compulsory by acts of law that, under Bismarck, were passed to counter socialist agitation, these social welfare institutions deeply altered labor relations in Germany. Thus was systematically undertaken what, in France, would be left to the good will of bosses, and would thus depend on the personal views adopted by humanist employers.

In her account of labor relations during the 19th and 20th centuries, Villéger, unfortunately, devotes one sentence to the French state during a period, 1940-1944, when political power-holders wanted to impose new employer/worker relations by promoting a paternalistic, Catholic approach. This lack of attention is unfortunate because this period signals the origin of the lasting taboo and ideological discredit surrounding paternalism in France since 1945. At the time, the labor movement was being revived through an ideology of resistance both against a totalitarian regime (which ignored citizens and saw them merely as a community of producers where there were neither unions nor collective actions) and against the alienation caused by work, an alienation that was spreading beyond industry into the service sector. The paternalistic approach has, for a long time, been ideologically discredited because power-holders who betrayed the ideals of the French Republic and the rights of citizens had tried to put it to use on a large scale. Is the upsurge of this current of thought among employers who claim to be humanists an accident at a time when the labor movement is in the throes of an unprecedented crisis in France?

Oddly enough, this article's genealogy of certain social, humanist achievements enables us to grasp the principal motivations of Christian employers, who wanted to instill loyalty in labor, in particular skilled labor. The commentators who, during the debate in the spring of 2018, forgot that the well-known "status" of railway workers (with its health, retirement and other benefits) were instituted for this very same reason before the war in 1914. At the time, the rail system's private management had motivations more economic than moral. To be convinced of this, you need but read the magnificent sociological studies on the major industries in France by Pierre Hamp, one of the founders of the Office of Labor Inspection.

What characterizes the current context is the heavy impact of globalized trade. This brings to minds the upsurge in trade between 1880 and 1910, when the doctrine of employer paternalism was expanding. Pierre-Noël Giraud's analyses of the labor market have shed light on the cleavage between the jobs exposed to global competition and those that, basically related to local sources of production and consumption, cannot be "outsourced". Might we not be able to argue that paternalism corresponded to a bygone era of local markets protected from globalization? that the emergence of neopaternalism can be analyzed differently depending on whether an industry is exposed or not to globalization? The state is being asked to "save" the jobs menaced by international competition — to save them by lowering employers' contributions to health or retirement funds or by intervening in housing or transportation — while employers are concentrating on the amenities that help them retain skilled workers, who can easily change their place of work (We need but think of the brain drain from southern Europe). This might be related to the "patronhumanist" approach, while local jobs are locked inside a low-pay sector where economic activities depend on the value created by the sectors open to international trade. For these local jobs, patronhumanism would be a new form of territorial solidarity, an acknowledgment of the state's retreat so as to concentrate its resources on defense and the development of the sectors the most exposed to globalization.

To end this brief historical analysis, I would like to draw attention to the absence of the labor movement in the discussion of "patronhumanism" — as if only the direct, personal relation between employer and employee, each taken separately, counts in this approach to management.

To conclude, we have entered a new world in the throes of an economic shock comparable to the sudden transformation wrought by the first two industrial revolutions. Social and economic equilibria have been massively overturned, and this has had strong repercussions on corporate management. In this setting, we observe not the eternal return of paternalism but instead a quest for new means of management, evidence both that the previous means are no longer adapted and that state institutions are unable to respond rapidly and effectively to these disequilibria. There is definitely an ideological crisis, the precursor for laying a new foundation for social regulation.

On paternalism: A brief critique of a too doctrinal and culturalistic approach

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Response to A. Villéger's article, "From paternalism to 'patronhumanism'".

Amélie Villéger's article "From paternalism to 'patronhumanism'" examines the history of labor relations in France from the angle of paternalism. According to it, the values (mainly coming from Catholicism) of French employers explain this history. This thesis draws, in a way, on Weber: "*Writing about the 'spirit of capitalism', Weber (1905) pointed to the need to associate ethical justifications with economic activities.*" Weber does talk about a "*spirit of capitalism*", relating it to the values of Protestantism; but the core of his analysis (of writings by Benjamin Franklin) is not, in fact, "*the need to associate ethical justifications with economic activities*".⁽¹⁾

Despite its interesting contents, this article can, in my opinion, be criticized for what it does not contain. This is a matter neither of a lack of space (as is always the case for published articles) nor of the choice of a particular perspective (a choice that is the academic's prerogative and duty). The problem is epistemological, namely, the risk of circularity (DUMEZ 2013). According to Popper, who clearly identified this, almost any theory can be said to fit some facts. Or, in Thomas Jefferson's (1829) words: "*The moment a person forms a theory, his imagination sees, in every object, only the traits which favor that theory.*" If the intention is to demonstrate that paternalism is a trend to be interpreted as the attempt to improve the condition of workers due to Catholic values, research will turn up documents for backing this argument. And this has been done: the author has found discourses and accounts that tend in that direction. What is problematic are the many other facts that have been omitted, facts from economic history and the history of doctrines, which a comparative perspective, even a minimal one, should have reported.

⁽¹⁾ This article, including quotations from French sources, has been translated from French by Noal Mellott (Omaha Beach, France).

As for doctrines, this focus on Catholicism has overlooked the importance of Protestant business circles in France's industrial development during the 19th century and their part in changing mentalities (about child labor, for instance). The author has also overlooked Saint-Simonianism and its key role in the history of French society and industry. Is it possible to talk about the paternalism of business circles in France without mentioning either Protestantism (The reference to Weber should have suggested this orientation) or Saint-Simonianism?

As for economic history, the article does not start from the development of industry. It is necessary to recall Joshua Freeman's work (2018). In the 18th century, mills were built along waterways or near deposits of raw materials. They were not usually near labor basins. Means of transport were barely existed, and workers could not spend twelve hours a day at the mill while dwelling so far away. Mills were thus forced to provide housing. Initially, the workers were children and women, or peasants who were not used to regular work and very easily quit. So, the "bosses" had to organize living conditions: housing, curfews, and leisure activities to fight against alcoholism and gambling. This occurred in England, France, Germany and the United States, in Catholic as well as Protestant lands. Values were a minor factor. The emergence of mills and factories in all countries required that the employer organize the living conditions for his workforce. In fact, exactly the same pattern can be observed in the former Soviet bloc, where factories managed housing, schools and leisure activities. Likewise, in contemporary China, giant factories have spawned cities that provide housing accommodations, centers for leisure activities and hospitals, and exercise a moral control over workers' lives. Chinese dormitories for workers do not have WiFi installed so that workers have a good night's sleep and be in shape to work in the morning. This is a far cry from social Catholicism.

Without being a certified Marxist, I do not think that paternalism can be analyzed without paying attention to the concrete, material conditions of production. If contemporary firms open daycare centers, this has nothing to do with paternalism (despite any proclamation of values of that sort). It is an effort to solve concrete problems that impinge on the organization of work. To understand this, we should move beyond discourses and values, and focus on the concrete conditions of economic production. This provides a transition toward my third point.

A comparative approach is, in my opinion, indispensable for this analysis. Throughout the 19th century, personnel turnover was the major problem in all factories. Skilled workers changed their place of work to acquire new skills (a phenomenon clearly described by Zola); and unskilled workers left to see their family, because they fell out with the foreman or wanted to take time off despite the boss's refusal. In 1913, when Ford introduced a revolution in production with assembly lines, the turnover rate in the factory making the Model T rose to 370%. To fill 14,000 work stations, 52,000 hires per year had to be made! So, Ford shortened worktime (to eight hours per day six days a week) and doubled wages. Measures of this sort can be interpreted as the cost of paternalism, which is what the author has done while discussing the situation in France. However the intent of such measures was to bring under control the much high cost of labor turnover. To benefit from working conditions at Ford, workers had to be married, productive on the job, and known to be sober. A "sociological department" was set up to train the personnel for verifying whether these criteria were met and to select workers accordingly. In Gramsci's words, "*the American industrialist is preoccupied with maintaining the continuity of the worker's physical efficiency, of his muscular and nervous efficiency. It is in his interest to have stable manpower, always in shape, because the firm's whole workforce (the collective worker) is a machine that must not too often be taken apart or have its parts replaced lest enormous costs ensue*" (Cahier 5, "Américanisme and fordisme", 1934, quoted in DUMEZ 2018). Despite Ford's well-known religious convictions, the major problem he faced, a problem exacerbated by

the assembly line, was the same as the problem faced by all heads of industrial firms during the 19th and 20th centuries. Even in Soviet factories in Russia, the peasant workforce had to be disciplined and retained after having been transplanted into a world that was new to them and hard to live. The solutions adopted to solve this problem resemble those that Villéger has described in the specific cultural context of France as paternalism, namely: housing, training, libraries, leisure activities, company stores with low-cost wares.

A clarification: this critique does not at all intend to state that values and discourses are of no importance when analyzing managerial phenomena, nor to affirm that social Catholicism played no role in France. Instead, my argument is that these discourses must be situated in relation to the concrete situations with which management had to deal, that they have to be analyzed as "language games" in the sense of Wittgenstein. In other words, what is to be analyzed is not the discourses as such but the way in which actions are "woven" into language (Wittgenstein 2004, §7); and the perspective to adopt should definitely be comparative. From a methodological viewpoint, the intent is to spare ourselves the risk of circularity, lest our theoretical perspective be skewed and the explanation given of a phenomenon (in this article, paternalism) come to be unraveled.

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Wastes as a potential commons: Towards a new form of governance of the environment

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For the circular economy, deposits of waste electronic and electrical equipment (WEEE) are becoming a secondary source of key raw materials for satisfying the growing needs of both digital technology and “green” energy, another major consumer of strategic metals. Working these deposits implies depolluting the wastes that contain dangerous substances with potentially tragic effects on people and the environment. These multiple and possibly contradictory issues have led to adopting rules of collective governance, which involve manufacturers, recyclers and public authorities. In Europe, WEEE is subject to the principle of the manufacturer’s responsibility for what happens to his products at the end of their life cycle. In France, this principle has led to setting up original arrangements for managing e-wastes through a governance similar to Elinor Ostrom’s common pool resources. This striking analogy is examined in order to provide a new view of waste management policy in France and identify the ways to eventually improve it.

A change can be observed in waste management policies over the past few years. From a regulatory approach centered on the pollution caused by wastes, a shift has been made to a policy for promoting wastes as a resource. This paradigm shift from wastes as pollution to wastes as a resource has been molded by the concept of a circular economy, which was made popular at the end of the first decade of the 21st century. In France, waste management is an axis in both the Circular Economy Roadmap (FREC) released in April 2018 and the bill of law on the circular economy introduced in early June 2019. The circular economy tends toward an economy that soberly consumes resources and tries to minimize its environmental impact (MINISTÈRE... 2018).⁽¹⁾

The circular economy, as problematized, has the objective of turning wastes into resources. Wastes thus become a secondary resource to be exploited, a substitute, insofar as possible, for primary raw materials. It is complicated to implement this promising idea because wastes are, by definition, second-hand products abandoned by their owners. Belonging to nobody, they potentially belong to everyone. They thus

become the subject of strategies for “capturing” their value when no regulations exist.

This paradigm shift has led to changes in public interventions in waste management. Since the 1970s, Europe has sought to hold economic agents accountable for fighting against the unauthorized dumping of wastes and responsible for the poor management of wastes and the pollution caused by industrial activities. This approach stems from the “polluter pays” principle, which initially targeted the activities of the industries emitting wastes that caused pollution.

The principle of “extended producer responsibility” (EPR) was thus worked out in the early 1990s (MÉROT 2014). It targets the economic agents at the source of wastes, the intent being to hold producers responsible for the end of the life cycle of the products they place on the market. One goal has been to provide financial relief to local authorities, who face growing piles of new types of wastes (plastic wrappings, electric and electronic equipment wastes or WEEE, end-of-life vehicles, batteries, etc.) without having the means or qualifications for handling them. Another EPR goal has been to induce producers to design their products so that recycling them will be easier, what has been called “ecodesign”.

⁽¹⁾ This article, including quotations from French sources, has been translated from French by Noal Mellott (Omaha Beach, France). The translation into English has, with the editor’s approval, completed a few bibliographical references. All websites were consulted in August 2020.

This policy for allotting responsibility is innovative in comparison with traditional forms of management, which pitted government interventions against private initiatives. It is complementary to traditional interventions by public authorities, such as regulations and incentives. In environmental problems, *“given the level of uncertainty, of complexity [...] and of the distribution of know-how between several parties, public authorities no longer have enough means or knowledge for unilaterally building a regulatory framework”* (AGGERI 2000).

Transposing the EPR principle into the law of EU member states has given rise, depending on the options selected, to different systems of waste management. In France, an original model of governance has arisen that musters private parties to collectively manage wastes; a common resource. This implies, beyond classical public-private contracts, a novel form of collaboration between the state and private entities. The transition toward a circular economy involves taking up a major challenge: mobilize all entities concerned (producers, recyclers, consumers, etc.). The intent is less to enforce rules than to encourage initiatives and develop innovative partnerships for the purpose of coming up with new solutions. The method for drafting the circular economy roadmap (FREC) and the transposition of its words into deeds illustrate this process. FREC seeks to be participatory and empowering.

This model of collective governance reminds us of the governance of the commons, the topic of many writings since the seminal work done by Elinor Ostrom. This article, drawn from work on a dissertation,⁽²⁾ proposes an original interpretation of waste management policy in France by making a detour through the commons. After indicating how the problem of WEEE resembles the tragedy of a common pool of resources, we shall use the literature to suggest how to overcome this tragedy. An approach is then proposed to wastes as a common good with a potential for being collectively valued; and an analogy, made between the governance of the “waste commons” in France and that of natural resources as described by Ostrom. This comparison helps us discern the major points of difference and imagine possibilities for regulation.

The tragedy of electronic wastes as a common resource

The development of digital technology and green energy has revealed developed countries’ critical dependence on special strategic metals. Essential to high tech production, this new source of geopolitical tensions is upsetting economic relations worldwide. China controls nearly 95% of the world’s production

⁽²⁾ MICHEAUX 2017. This dissertation was conducted under the Chair “Mines Urbaines”, which groups the three engineering schools in the ParisTech network. Its methodology entailed consulting many secondary sources (reports, acts of law, studies, etc.) and carrying out approximately sixty semidirective interviews with various people in WEEE in France and Europe. See <http://mines-urbaines.eu/fr/accueil/>.

of rare earths, including neodymium and dysprosium (used in the magnets of wind turbines). Although rare earths only amount to 0.01% of the production of iron and represent an annual market of \$6.5 billion — 276 times less than the oil market (PITRON 2018, p. 179) — China’s dominant position is a factor of fragility for all branches of high tech that depend on these metals, even though very small quantities are at stake.

The urban mine, valuable deposits with tragic consequences

From the perspective of a circular economy, the wastes from electric and electronic equipment (WEEE) represent a noteworthy deposit of strategic metals. To imagine WEEE’s potential value as a secondary resource, an analogy has been made with “urban mines”, the “place to prospect for new deposits of raw materials” (GELDRON 2016).⁽³⁾ While “natural” mines are being depleted, urban mines are stocking ever more metals. A tonne of mobile telephones contains an estimated 200 g of gold as compared with 5 g/tonne of minerals extracted from a “worthwhile” goldmine. In addition, working urban mines can help relieve the economic and environmental pressures on raw materials.

However the analogy with mining has limits. The major one is the complexity of tapping the resources contained in wastes. In effect, the electronic wastes in urban mines are dispersed and polluted; and their composition varies with changes in technology, changes so rapid that the European Union has to regularly update its list of strategic metals. Besides, despite their potential as a strategic resource, electronic wastes also contain substances dangerous for people and the environment, substances ranging from refrigerants to the mercury in fluorescent tubes or flat backlight screens, or the heavy metals like bromine in flame retardants for plastics.

Europe has strict regulations about handling WEEE, but this is not the case everywhere else, in particular in Africa and Asia. In these countries, the retrieval of the value stored in WEEE overrides the protection of health and the environment. In these lands, the wastes are processed in very small-scale operations heedless of the sanitary and environmental effects. Chip cards are heated to remove soldering; cables, burned to retrieve the copper but with the emission of toxic smoke. Highly concentrated acid baths extract the gold from circuit boards, the residue left to pollute soil and streams.

While the inappropriate processing of WEEE has tragic effects, the value of urban mines has been significantly underestimated. Only a quarter of the metals contained in WEEE are recycled — less than 1% of strategic metals (UNEP 2011). In fact, these strategic metals are often complex alloys that have to be separated from other substances, a costly operation. Retrieving WEEE is not so much a technological as an economic challenge.

⁽³⁾ MINE URBAINE© et MINES URBAINES© are trademarks owned by the firm RECUPYL and ParisTech Foundation.

A parallel with the tragedy of the commons

The WEEE situation is a variant of the “tragedy of the commons”, a phrase coined by the ecologist Garrett Hardin (1968). His well-known article cites the example on a pasture open to all herdsmen. Pushed by his own interest, each herdsman will be tempted to bring ever more cattle to graze on the commons. This ultimately depletes the resource, and the pasture will no longer be of use. This example illustrates that actions by a plurality of persons are unable to favor the conservation of a joint resource because of the centrifugal forces of individual interests. Hardin concluded that the optimal management of a commons necessitates either private ownership or state allocation.

This predatory “logic” leads to a tragedy... with a few qualifications in the case of electric and electronic wastes. WEEE represents a store of value that does not, in principle, belong to anyone. This abandoned value is the source of the informal (or even illegal) operations that seek to retrieve it. Motivated by the quest for profits, these operations pay no heed to the environmental impact. The greed of these economic agents pushes them to collect a maximum of wastes in order to retrieve as much value as possible at the lowest cost. By grabbing important deposits of WEE (nearly two thirds of those produced in Europe), these informal operations jeopardize the legitimate business of companies in the formal (or official) economy in Europe. These informal businesses do not play by the rules, destabilize the system and impair the development of industries much better equipped to process wastes. The impact on nature and human health is negative; and the importance and value of WEEE are underestimated. As in the situation described by Hardin, this tragedy can be blamed on opportunists who, in pursuit of their own interests, are heedless of environmental regulations or ethical rules.

How to cope with the tragedy of the commons?

To see how to cope with the tragedy of the commons, we must turn to Elinor Ostrom’s (1990) work. This recipient of the Nobel Prize in Economics formalized another conception that objected to Hardin’s pessimistic view, considering it to be reductionist since it overlooked economic agents’ capacity for self-regulation. She proposed an interpretation for a much more sustainable management of the commons.

Ostrom sought to show that several ancestral communities had successfully undertaken the collective conservation of a common resource while resisting the hegemony of globalization and the dominance of the laws of the marketplace. She adopted this approach to study cases from around the world of communities that have kept this form of collective management for the conservation of the natural resources useful to them. A major result of her research was to identify eight principles for the governance of “common pool resources”, namely:

- Clearly define the limits of the resource and the limitations on users’ rights. This principle brings into the picture the users of the resource, *i.e.*, the group of

individuals who have a stake in its efficient management.

- Establish rules of use adapted to local conditions and obligations.
- Set up arrangements for users to take part in collective decision-making and the adoption of operational rules.
- Establish a system for monitoring the resource in which supervisors are accountable to users or are themselves users.
- Impose a graduated set of sanctions as a function of the seriousness and context of violations. A key to success is that users themselves, instead of an outside authority, should make decisions about sanctions.
- Institute rapid, low-cost procedures for settling conflicts.
- Obtain at least a minimal recognition by outside authorities of the right of communities to organize themselves and of the rules stemming from this self-organization.
- Nest multiple layers of rules and institutions.

The key is to involve those who use the resource — called “*commoners*” — in setting up the rules for conservation of the resource. For Ostrom, Hardin’s tragedy resulted from the absence of user-made rules. It corresponded to a *laissez-faire* that eventually depletes the common resource.

We can point out a first difference with the idea of wastes as a commons: wastes have no “natural” value, unlike so-called natural resources, such as plant- or wildlife or raw materials. Electronic wastes are a source of pollution to be eliminated; but the collective actions of collecting, decontaminating and processing these wastes are what endows them with a potential value owing to the substances they contain.

A recent approach to the problem of the commons helps us deepen the analogy. Since the digital revolution, the idea of the commons has been expanded to cover immaterial goods, such as information (DARDOT & LAVAL 2015, CORIAT 2015). Since Ostrom’s studies of “natural” commons, a whole field of research has been opened on the commons as a center of collective actions.

The commons as a form of politics

Nowadays, communities of citizens are demanding the creation of common pool resources and the right to use them. The commons is presented as a cure for the lack of confidence in politics, as evidence of new forms of sociability, sharing and cooperation, as “*spaces of citizen initiatives of co-construction*” where users enjoy a degree of “*direct participation in collective management*” (MONSEIGNE 2016). Pierre Dardot and Christian Laval (2015) have boosted this approach by proposing a view of the commons as a new form of collective action that results from mobilization and can take a multitude of forms. Benjamin Coriat (2015) has adopted a similar approach to discussing the “return of the commons”. As these authors admit, the commons used to be related to the nature of things; it did not

necessarily exist prior to collective action. But the commons is now related to actions by people: it emerges through and from collective action. This approach prefers the verb form of “*commoning*” (FOURNIER 2013), i.e., the “*process of putting in common*” (LEYRONAS & BAMBRIDGE 2018), which sheds light on the fertility of this idea. Through feedback, the commons creates a collective action that will fertilize it and produce new forms (FOURNIER 2013). The processes for endowing WEEE with value can thus be likened to the activity of “*commoning*” whereby the common resource emerges from collective action.

Three key factors and the example of Wikipedia

The commons now has many forms. Three points — a resource, a community and a governing structure — define it and set it apart from as a collective action. The resource might be natural (a river or forest), material (a theater or fleet of wind turbines) or immaterial (software or knowledge). The community is the group of individuals who claim the right to use this resource. Through collective discussions and negotiations, it lays down the rules for using the commons and institutes reciprocal obligations. These group-made rules give shape to a governing structure.

A well-known example of an information commons is Wikipedia, the online encyclopedia. In this case, there is no need to protect a material, “natural” resource against the risk of depletion. Instead, the risk is that the quality of the information in the encyclopedia declines. This quality is what is to be protected. For this purpose, rules and conventions have been collectively established. Let us examine Wikipedia as a common pool resource in relation to the three aforementioned points.

The **RESOURCE** is an encyclopedia that, like general and specialized encyclopedias, almanacs and atlases, contains information. It is made up of articles classified by category.

The **COMMUNITY** is formed by Wikipedia’s users. It is open to all: any user may become an author, corrector and contributor.

Two aspects of its **GOVERNANCE** are salient: the special status of some members of the community and the ranking of rules. Some members of the community have a special status and are technically qualified in comparison with ordinary contributors: the positions of system administrator and of system operator (the persons who manage accounts, verify addresses, etc.). These operators probably have the broadest technical power, since they may delete or protect pages, or sanction behaviors. Decisions are made by consensus. Any user may initiate a process for making a decision. Different tools and methods help the Wikipedia community reach a consensus. In addition, rules are ranked in a hierarchy, which may be modified at any time. Only the “*five pillars*” cannot be changed, namely: Wikipedia is an encyclopedia; neutrality of viewpoint; “*free content that anyone can use, edit and distribute*”; “*respect and civility*” between editors; and “*no firm rules*” apart from these five.⁽⁴⁾ Rules

⁽⁴⁾ https://en.wikipedia.org/wiki/Wikipedia:Five_pillars

and recommendations stipulate what is accepted or not (the respect of copyright law, the right to modify posted information, etc.). For example, a contributor may not, given the pillar on neutrality, post unpublished work from his own research. Conventions have also been established to see to the coherent presentation of contributions (page layout, typesetting, etc.). If conflict occurs or the rules are violated, various methods of dispute resolution exist, ranging from requests for community input to recourse to an arbitration committee, a procedure that might lead to blocking a user’s account.

The enthusiasm created by the commons movement opens possibilities for responding to the problems related to collective action. For WEEE however, a major difference exists; and Ostrom’s principles of common pool resource governance cannot be applied as such. The aforementioned commons, whether natural or informational, have arisen out of a spontaneous demand by persons who are willing to take responsibility for the common resource and have a direct interest in doing so. In the case of WEEE, these persons do not exist. In fact, the value in wastes is not directly accessible. It is a potential to be realized only if the wastes are processed collectively. So, the actions of collecting, decontaminating and processing must be performed in order to recuperate the value of the secondary substances latent in these wastes. In other words, there are no commoners at the outset.

This major difference means that a new sort of commons must be designed wherein the state plays the key role by designating the leaders and parties responsible for developing this commons. To pursue the analysis of wastes as a potential common pool resource, let us look at the EU’s EPR and at the French case.

The EU’s extended producer responsibility (EPR)

Under EU directives about the wastes subject to the principle of extended producer responsibility (EPR), producers of the wastes have two options. They may assume their responsibility individually (by setting up WEEE collection points for recuperating their own products and equipment at the end of their life cycle and processing them in compliance with regulations) or collectively (by joining an organization that groups several producers and manages shared points of waste collection). For obvious reasons related to economies of scale, most producers choose the latter option, whereby an organization assumes the responsibility for achieving the collection and processing objectives of its members, objectives calculated as a function of the volume of the products that these members have placed on the market.

In France, application of the EPR principle has spawned approximately fifteen EPR groupings, each for a certain sort of wastes: end-of-life vehicles, batteries, textiles, WEEE, etc. These groupings are managed collectively by “*eco-organizations*”, a term proposed by Alain Geldron, a national expert on raw materials at the French Agency for the Environment and Energy

Management (ADEME). The producers who do not want to set up their own system may thus transfer their obligations for collecting and processing the wastes coming from their products to an eco-organization by making a payment. There are two eco-organizations for WEEE: Eco-Systèmes-Réylum (ESR) and Ecologic.

France is not the only country that has transferred the governance of wastes to eco-organizations. Such organizations exist in other EU member states. A study by ADEME (2016) has identified the points of convergence and divergence in the systems of member states for organizing and funding EPR groupings. Let us focus on the case of France with its particular model of joint consultations and collective responsibility, which implicates a large number of stakeholders for managing wastes and extracting value from them.

EPR groupings in France: A governance of the commons?

This collective model is related to a form of governance for common pool resources. Before insisting on the major difference (the “natural” absence of commoners), let us pursue the analogy by describing the characteristics of wastes as a common resource (cf. Table 1) with a community of users and stakeholders that has a governing structure.

THE RESOURCE is the wastes that have a value if collectively processed to extract it. They are a source of energy, of substances and of spare parts. In 2016, 80% (in tonnes) of WEEE were recycled. The others forms of processing involved extracting energy (8%), reconditioning for reuse (1%) and reusing parts (1%), while 10% were eliminated (ADEME 2017). However wastes do not “naturally” have a value. The net value of most WEEE is, in fact, negative owing to the costs of decontamination and processing. In 2013, the income from all eco-organizations amounted to €87,979,000 in comparison with operational costs of €203,854,000 (ADEME 2014).

From the viewpoint of a circular economy, we see farther and can talk about the social value of wastes. Waste management creates local jobs, which cannot be offshored, and brings people back into the labor force. According to a recent study (ORDIF 2018), nineteen full-time jobs were created per 10,000 tonnes of household wastes in Île-de-France, which includes the greater Paris area. WEEE alone accounts for 7000 jobs in France, 2700 of them mostly in the “social

and solidarity economy”, in jobs related to reusing wastes (ECO-SYSTÈMES 2017).

THE COMMUNITY OF USERS AND STAKEHOLDERS: ITS ORGANIZATION AND SPECIAL STATUS. This community is mainly made up of producers or, more precisely, those parties who bring their products to the market and are subject to EPR. However it is important not to forget stakeholders, who also take part in the governance of EPR groupings, among them: local elected officials, certified associations for the protection of the environment, national consumer organizations, the operators involved in waste prevention and management (including those in the “social and solidarity economy”), labor organizations, representatives from the ministries concerned, and ADEME as an expert.

In the case of WEEE, all producers of household appliances have chosen the option for sharing the responsibility of managing these wastes by joining one of the eco-organizations in charge. Depending on the volume of products placed on the market, the producer has to pay a fee, the “eco-participation”, for funding the system. This eco-participation is passed on to consumers. The WEEE eco-organizations have come out of an experiment conducted in the Nantes metropolitan area between 2002 and 2004 and funded by ADEME. The objective was to gauge the conditions (logistics, estimates of the volume of movements and costs, etc.) for setting up a nationwide organization. This experiment involving 200 producers and trade groups was intended to lead to the formation of a collective organization. Since WEEE covers quite different products and markets, three eco-organizations were formed: Eco-Systèmes for big household appliances, Ecologic mainly for ICT (information and communications technology), and ERP (which has lost its certification) for Europe. These WEEE eco-organizations are operational. Apart from the funding that they bring to local authorities for waste collection, their major assignment is to orient the flow of wastes toward processing centers. From this purpose, they sign contracts with services that provide the logistics for transporting the wastes toward the centers, where they are grouped by category (cf. Figure 1).⁽⁵⁾ The wastes are then oriented toward processing centers for decontamination,

⁽⁵⁾ Big household appliances (GEM F and GEM HF, respectively “cold” and “not cold”), screens and small household appliances (PAM).

	<i>NATURAL COMMONS</i>	<i>WASTES AS A COMMON POOL RESOURCE</i>
<i>Resource</i>	A natural resource	Wastes, a material resource
<i>Community</i>	Farmers or others	Producers of the wastes
<i>Structure of governance</i>	As described by Ostrom’s principles	An executive committee (<i>commission des filières</i>) and terms-of-service requirements

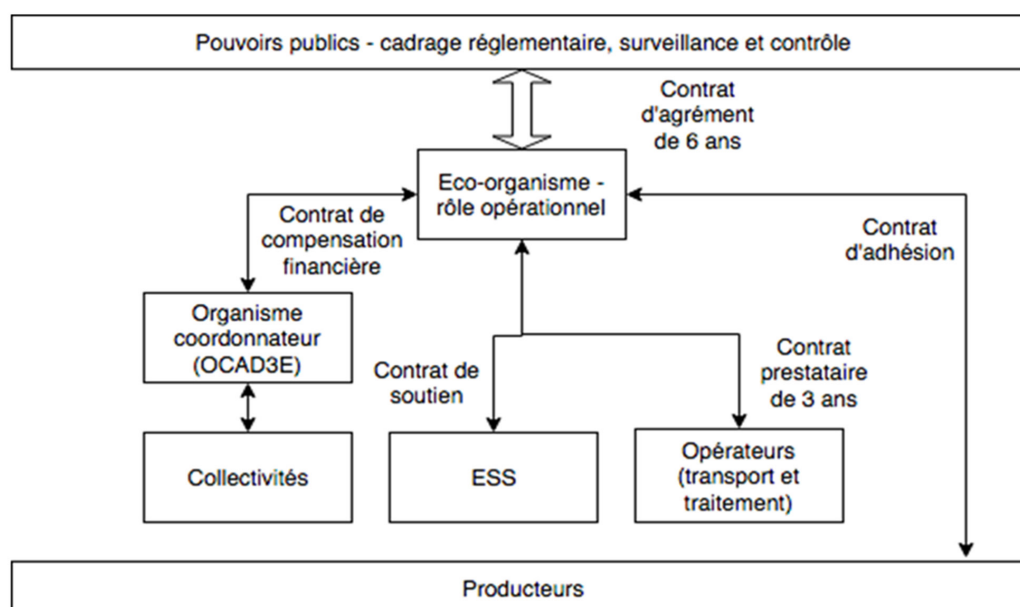


Figure 1: The contracts that shape the EPR system for WEEE

crushing and sorting of the output before reselling whatever has a value on the raw materials market. Part of the income from sales goes to the supervisory eco-organization.

These eco-organizations enjoy a special legal status: they have an assignment in the general interest but operate under private law. In this sense, they are nonprofit organizations certified by public authorities for a 6-year period, which may be renewed. They are subject to a strict set of requirements that define best-effort and performance obligations as well as their relations with stakeholders. Under French regulations, the entities that place products on the market are responsible for governance. Eco-Systèmes-Récyclum is the eco-organization representing most WEEE producers: 1599 producers (representing 78.9% of the equipment placed on the market) belonged to it in 2017. Its governance is exercised by 41 firms; but state authorities examine the books.

This special legal status places an eco-organization's activities on the borderline between private and administrative law — a source of confusion and sometimes of conflict between parties. Disputes have arisen about the conditions for collecting wastes and about funding between certain eco-organizations and the local authorities who have signed contracts with them. The multiplication of legal actions involving certain EPR groupings has hampered, even paralyzed, their operations. Legal actions have had one positive effect: they have clarified the venue for hearing cases involving contracts between eco-organizations and local authorities. Four court decisions have concluded that these contracts are under administrative (and not private) law.⁽⁶⁾

⁽⁶⁾ A decision on 5 December 2017 by the appellate court in Angers; a decision on 15 February 2018 by the appellate court in Nîmes; and two decisions on 29 May 2018 by the appellate court in Bordeaux.

THE GOVERNING STRUCTURE: CONSULTATIONS AND TERMS OF SERVICE. A special aspect of EPR groupings in France has to do with the procedure for drawing up the terms of service through consultations with stakeholders. These consultations take place within an executive committee (*commission des filières*), a governing body that reaches across all EPR groupings and eco-organizations (cf. Figure 2). Besides its advisory role in relation to the minister of the Environment, it can be consulted for an opinion about the terms of service in EPR groupings. This committee has the tasks of mediation and of harmonization between these groupings. Its members come from the state, producers, local officials, the operators involved in the waste prevention (including those in the “social and solidarity economy”), associations, labor unions and eco-organizations (The latter do not vote however).

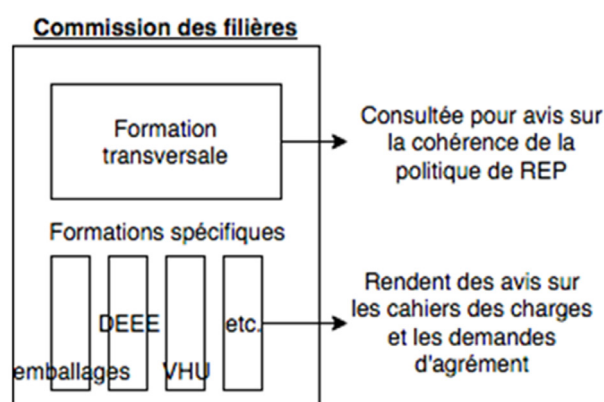


Figure 2: The governing structure of EPR groupings

Each EPR grouping has a similar governing structure adapted to its sector: a “*place of dialog, exchanges, consultations, for sharing initiatives and pooling experiences between stakeholders on the topics specific to each grouping*” (Article D541-6-1 §VI).

These structures issue opinions on plans for decrees that will stipulate or modify the terms of services, on demands for certifying eco-organizations and on the approval of producers' proposals for setting up their own waste management systems. Figure 3 outlines the certification procedure.

These committees bring all stakeholders around the table for discussions about the clauses to introduce or modify in the terms of service of eco-organizations. Through regular meetings, they monitor EPR groupings, verify whether the objectives fixed by regulations have been reached, identify shortcomings and eventually propose improvements. Their role is, however, advisory; the executive committee itself has no decision-making powers. In parallel, various work groups make reports on topics submitted for consideration.

As certifications are renewed, the terms of services are redefined to include an ever expanding range of assignments. In the WEEE grouping, the terms of service have grown from four to more than forty pages (in the most recent version released in 2014). Beyond the objectives of decontaminating and processing wastes, the WEEE eco-organizations have the duties: to *“undertake actions for promoting the prevention of the production of wastes, as of the phase of the design of household electric and electronic equipment”*; to modulate eco-contributions as a function of the criteria laid down by the certifying commission; to *“see to employment”* for specific categories of job-seekers by proposing agreements with *“certified companies in the social and solidarity economy”*; to develop new channels of waste collection; and to *“foster research, development and innovations in the field of prevention and in procedures for collecting and processing household WEEE”*.⁽⁷⁾ The priorities for research are to fight against illegal waste disposal operations and study the processing of plastics

⁽⁷⁾ The terms of service in the appendix of the decree of 2 December 2014 on the procedure of certification and the terms of service of WEEE eco-organizations.

containing flame retardants and the recycling of strategic metals. The last topic is at the origin of the Chair of Research “Urban Mines” created by Eco-Systèmes on 11 February 2014.

How this new commons is different...

A comparison of a “natural” commons with wastes as a commons brings to light the significant differences between their forms and types of governance (cf. Table 2). Let us now examine the specific characteristics of wastes as a commons in comparison within “natural” and “informational” commons.

THE GOAL: CREATE VALUE. The goal is not the conservation of a resource (as for a natural commons), nor to augment or ameliorate a database (as for an informational commons), but to endow electronic wastes with an economic value, to turn them into a resource with an optimized life cycle so as to limit the consumption of raw materials. WEEE as a common good is both negative, since these wastes might contain toxic substances, and positive since they might be a valuable resource.

A COMMONS INVOLVING PUBLIC AND PRIVATE ACTIONS: Beyond these different goals, the major difference has to do with the status of the parties involved. Research on the commons has concentrated on case studies outside the marketplace or state. In contrast, handling WEEE as a common good involves a mixture of market activities and government actions. On the one hand, producers have a leading role in managing wastes as a commons, and have been designated to play this role under the EPR principle. On the other hand, the state has a key place in instituting a governing structure for this new commons, since producers have few natural incentives for being concerned about the products they have placed on the market at the end of their life cycle. While allowing room for economic agents to maneuver, carry on with their business, innovate and find solutions, the state has to maintain its surveillance and control in order to see to it that objectives are attained.

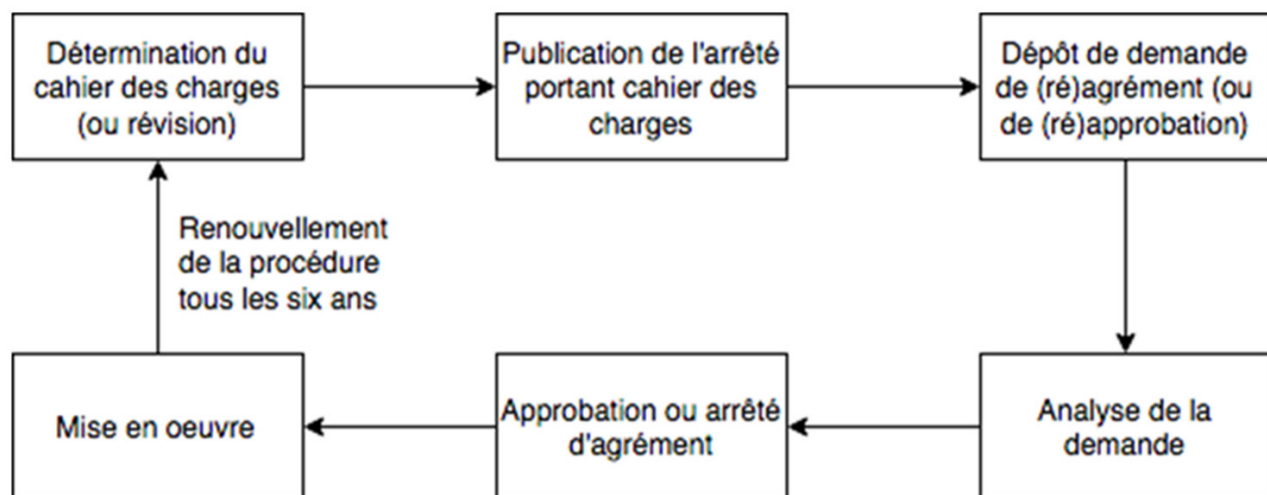


Figure 3: The procedure for certifying eco-organizations

<i>Principles</i>	<i>EPR groupings</i>
Clearly defined limits related to the resource and users' rights	Wastes subject to the EPR principle are a matter of law — laws that designate the parties placed in charge of waste management. Regulatory measures state how the EPR principle is to be applied through the authorization granted to certain parties (groups or individuals) to tap these wastes as a resource.
Rules of use adapted to local conditions	Terms-of-service requirements foresee taking the local context under consideration and including local companies from the “social and solidarity economy”.
Arrangements for user participation	An executive committee (<i>commission des filières</i>) organizes discussions about the terms of service and requirements imposed on eco-organizations.
System of monitoring	Producers and operators are overseen by “eco-organizations” and, in the case of the operators of installations classified for the protection of the environment (ICPE), by the state. The eco-organizations are audited annually; and their finances, audited by state authorities.
Graduated sanctions	In cases of violation, the administration sends a warning by mail to the producers concerned. A fine might be imposed. An eco-organization might be fined €30 million or stripped of its certification.
Procedures for settling conflicts	Conflicts are settled via legal actions in court.
Recognition by authorities	Public authorities make the decisions about releasing the terms of services and certifying eco-organizations.
Nested rules and institutions	Several EPR groupings by type of wastes exist, all of them governed by a committee (<i>commission des filières</i>). Several EU member states have such groupings.

This public-private governance ensues from the absence of any commoners who spontaneously claim responsibility for waste management.⁽⁸⁾ Public authorities have to appoint the commoners.

Wastes as a resource, another model of the commons

The aforementioned differences lead us to think that WEEE is a “potential commons” that has to be created — an “*unknown commons*” (BERTHET 2013) in the sense that everything needs to be done. Commoners have to be appointed by authorities, and the value inherent in the wastes has to be realized through a group effort for processing the wastes, extracting value from them and innovating.

As a consequence, the EPR system in France enables us to imagine another model of the commons that, instead of being set opposite government actions or market activities, is based on a rationale of COREGULATION whereby the “commoning” of WEEE is related to a policy negotiated by producers, public authorities and other stakeholders. This new commons takes the

⁽⁸⁾ By waste management, we mean, of course, a “responsible” management of wastes and not an opportunistic, informal recuperation of wastes outside the scope of social and environmental regulations.

form of a government policy technique. It does not arise out of a cause or from the demand of economic agents who lay claim to a resource. In the case at hand, the commons is a means for state regulation. Given the absence of commoners however, the state has to appoint the persons to be in charge and institute a form of governance for the WEEE commons.

For political authorities, the interest in instituting this commons is that “*Although the commons is not necessarily a matter of consensus [...] once formulated (in an assembly, meeting at work, planning group) [...] it cannot be brushed aside with a wave of the hand. Once on the table, its importance can be discussed; its priority, questioned; its grounds, contested [...] Common goods do not dispel conflicts, they furnish them a line of dynamic tension*” (CORDONNIER 2012, p. 6). A commons leads us to recognize what is shared, to discuss and protect it; it is a space of power struggles (LEYRONAS & BAMBRIDGE 2018).

So, to complete Ostrom's principles for the governance of common pool resources and adapt them to WEEE, principles have to be added about creating what is “commoned”, designating the group involved (the commoners) and forming a collective organization with a mission and governing structure that involves all stakeholders (MICHEAUX 2017).

Regulating wastes as a commons: How to make improvements?

The coregulation model of EPR groupings in France is not above criticism, and will doubtlessly undergo improvements in the coming years.

In the case of WEEE, many criticisms have already been voiced. Planned obsolescence is a recurrent reproach made against electronic products and appliances for the general public. Consumers have little confidence in manufacturers. According to a poll by the Institut National de la Consommation (INC), nine out of ten people in France think that obsolescence is indeed planned.⁽⁹⁾ Recent measures in favor of products with a longer life cycle are not always applied, and consumers are often unaware of them.⁽¹⁰⁾ According to a DGCCRF survey, the measures adopted by professionals have been inadequately implemented.⁽¹¹⁾

Meanwhile, given that electronic wastes contain potentially valuable substances (as in chip cards) as well as highly dangerous substances (e.g., plastics with bromine in flame retardants), engineers in the WEEE grouping have been busy. Reusing recycled plastic is now the subject of several research programs. To cite a successful example: SEB, Veolia and Eco-Systèmes-Récylum have pooled their know-how to set up a full loop in the circular economy for small household appliances.⁽¹²⁾

As for the future and governance of EPR groupings, a report drafted as part of the Circular Economy Roadmap (FREC) was published in March 2018. Its conclusions served as the starting point for the bill of law on the circular economy (introduced in June 2019). Jacques Vernier (2018), the rapporteur, has drawn attention to the fact that the system of coregulation strays when the parties involved do not assume collective responsibility. His remarks were based on the example on another EPR grouping (“special and scattered wastes”), which has been paralyzed by persistent conflicts about the terms of service. In contrast, the proactive approach of the eco-organizations in the WEEE grouping has been acknowledged (European Commission 2017).

How to provide more incentives on the individual level and develop solidarity on the collective level? Let us refer to Ostrom’s principles, which shed light on an effective, sustainable governance. In the case at hand, we notice that not all these principles have been upheld.

⁽⁹⁾ See: “Les nouveaux pièges de la conso”, *60 millions de consommateurs*, special issue 173, June 2014.

⁽¹⁰⁾ Act n°2014-344 of 17 March 2014 on consumption; Act n°2014-856 of 31 July 2014 on the social and solidarity economy; Act n°2015-992 of 17 August 2015 on the energy transition and green growth.

⁽¹¹⁾ DGCCRF (Direction Générale de la Concurrence, de la Consommation et de la Répression des Fraudes). See: <https://www.economie.gouv.fr/dgccrf/information-des-consommateurs-sur-garanties-et-disponibilite-des-pieces-detachees-contrôle>

⁽¹²⁾ Veolia (2016), “Le Groupe SEB, Veolia et Eco-Systèmes créent le premier partenariat industriel pour le petit électroménager recyclé en France”, press release of 5 February 2016.

Principles but party upheld

UNGRADUATED SANCTIONS: When a certified eco-organization does not comply with its terms of service, the EPR regulatory framework foresees sanctions, but these are far from graduated. According to Vernier (2018), existing sanctions for eco-organizations are lacking in proportionality: in the main, a fine of €30,000 (a paltry sum when the income of an eco-organization like Eco-Systèmes-Récylum amounts to more than €100 million) or a suspension (or even cancellation) of its certification. Given the place now occupied by eco-organizations and their accumulated experience, it is hard to break a contract or radically modify it. Besides, the law has not foreseen the replacement of an eco-organization. Case law consists of a single case involving the nonrenewal of certification, but it has clarified a few points about the already collected “eco-contributions”. For Verdier, the revocation of certification is an “atomic” sanction. Another criticism made by the rapporteur of the bill of law is that no sanctions have been foreseen for not reaching the objectives set in the terms of service. To make up for this, he has recommended introducing monetary sanctions, as in the energy sector, where objectives have been set for saving energy along with penalties for each extra kWh sold.

THE ABSENCE OF FAST, CHEAP PROCEDURES FOR SETTLING CONFLICTS: The disputes, past or current, that have set some eco-organizations at odds with local authorities or with the processors of wastes have not been settled either fast or cheaply — as clearly shown in the previously mentioned example of repeated legal actions about the conditions of waste collection.

The government’s proposals

Measure 28 in the FREC roadmap tries to make up for these shortcomings. It seeks to “*refund the pact of confidence of EPR groupings in order to make more room for eco-organizations while reinforcing the state’s means of control for seeing to it that objectives are reached*”. For this purpose, measure 28 lists six points, among them: simplify the regulatory framework so that requirements are tied to objectives; apply effective financial sanctions and incentives when objectives are not met; activate the means for effective controls; foresee the measures to be undertaken when the certification of an eco-organization that holds a monopoly is withdrawn or discontinued. These measures will increase the influence of the EPR governing structure by providing it with a better graduated set of sanctions. Financial sanctions that are actually dissuasive could then be systematically applied, and the threat of losing certification following repeated violations would have clout.

As for the settlement of conflicts, Jacques Vernier (2018) has suggested creating an independent administrative authority funded by eco-organizations and the firms that have set up their own systems. This authority would have a committee that could apply sanctions using the new graduated system. Though not adopted as such by FREC, this idea is at the origin of a point figuring in measure 28, namely: the need to “*mobilize the necessary means for investigating requests for certification, monitoring them and exercising effective control*”.

In the tracks of the FREC roadmap, the government introduced, in early June 2019, a bill of law on the circular economy and the fight against wastes.⁽¹³⁾ Its provisions about controlling and sanctioning eco-organizations have been worked out. The government has opted for an executive order instead.

To clarify the status of eco-organizations and alleviate conflicts, another idea emerged from interviews with one of these eco-organizations: grant these organizations a special status and reassert the mission of general interest as their finality. This proposal falls in line with the PACTE Act on the growth and transformation of firms. Article 176 of this act opens to profit-with-purpose corporations the possibility of “*publicizing their qualification as a ‘firm with a mission’*”.⁽¹⁴⁾ Companies that want to do so may formulate in their statutes a mission with positive measurable effects on society and the environment. Five conditions have been laid down for obtaining this qualification. One of them is to set up a “mission committee” for monitoring and verifying observance of the mission. An independent third party is to verify whether the objectives are fulfilled.

For eco-organizations, this would mean setting up a multiparty committee for grouping all stakeholders for periods of certification. This committee would be the

⁽¹³⁾ <http://www.terraqui.com/blog/wp-content/uploads/2019/06/Projet-loi-economie-circulaire-5-juin-2019.pdf>

⁽¹⁴⁾ This idea came from a report (NOTAT & SENARD 2018) based on the results of a work group that sought to theorize the concept of a “firm with a mission” (SEGRESTIN *et al.* 2015).

place where criticisms are voiced and conflicts settled. It would be a “fast-track” for settling differences before ultimate recourse to a court of law, a procedure that necessarily lasts longer and costs more.

The principles of coregulation

To see to it that changes in the future will not adulterate the system for organizing wastes as a commons, let us conclude by identifying the elementary principles for a theory of coregulation, principles parallel to Ostrom’s (cf. Table 3).

The first three principles have to do with creating what will constitute the commons and with forming the group of collectively responsible “commoners”. The fourth principle is about choosing a key player for seeing to the pursuit and renewal of the commons. The fifth emphasizes the centrality of a collective organization that orchestrates stakeholders’ activities. The last two principles focus on the possibility of modifying the system and on the need for sanctions. They were already present in Ostrom’s work. Here however, the accent is shifted toward the legitimacy of interventions by public authorities and the dynamics of the system so as to foster group learning.

Given this theoretical model of coregulation, we could imagine transposing it to other societal problems in which collective action encounters diverse interests in situations where the concerned parties do not spontaneously assume responsibility.

Creation by partners (the state, firms, etc.) of what is to be held in common and of the group of “commoners”	<ol style="list-style-type: none"> 1) Depending on their qualifications, parties are appointed to be collectively responsible for responding to a problem of general interest. 2) The process of creating a sense of responsibility opens with a first, exploratory phase and negotiations between partners. 3) Responsibilities are then shared and formulated by the assignment of a “mission” that states the objectives and commitments made by both sides.
The formation of a collective organization with a mission	<ol style="list-style-type: none"> 4) The mission may be delegated to an organization that will act in the name of its members and seek to retain their support. 5) This organization’s governing structure involves all stakeholders and can exercise influence over the making of the rules to which it is subject.
The possibility of overhauling the model and reinforcing interventions by public authorities	<ol style="list-style-type: none"> 6) The mission and objectives assigned to the organization may be modified depending on the results and problems, and as a function of the objectives set by public authorities. 7) Interventions by public authorities might be necessary if this form of self-organization drifts from its purpose (proven opportunistic behaviors, the missing of objectives, the presence of “free-riders” whose activities menace the collective action).

Conclusion

Thanks to the analogy with the commons, we see that considering wastes as a potential resource to be tapped implies setting up a collective governing structure grounded on shared rules. What is special about wastes as a (potential) commons is that there are no “natural commoners” ready to address the problem of wastes. The state has to create this “community” by holding producers responsible for the products they have brought to market once these products reach the end of their life cycle. Since producers have not been able to act on their own, eco-organizations are there for the followup. As responsibility has thus been transferred, the missions assigned to eco-organizations have expanded. We now expect these organizations to move beyond managing the end of product life cycles and toward fostering innovation so as to turn wastes into resources while taking responsibility for distributing the value thus created among the companies belonging to EPR groupings.

Despite the increasing qualifications and competence of eco-organizations, the state should not withdraw from this sector. On the contrary, even though the EPR principle has significantly affected waste collection and processing, changes are still needed to provide more incentives on the individual level and more solidarity on the collective level. The literature on the commons has revealed the need for both graduated sanctions and procedures for a fast, low-cost settlement of conflicts. The state's role is to supervise, monitor, control and modify the terms of service that define the mission of this commons.

Unlike a traditional commons outside the state and the marketplace, wastes as a commons is based on a form of coregulation between public authorities and eco-organizations. In this mixed form, the state tries to make private parties responsible through an evolving institutional framework of regulations and negotiations where economic agents may freely propose new solutions. This coregulation relies on the synergy set off by making these agents responsible through continual interactions with state authorities. This mixed model is intended to stimulate a collective action that, based more on cooperation than competition, will create value.

Thanks to this model, we imagine a new type of commons as a policy technique for government, as an original sort of state interventionism in line with the principles enumerated. This model has characteristics that make it worthy of consideration for managing other complex problems, when classical forms of regulation are unable to generate an innovative collective action organized around ambitious societal objectives.

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Four corporate strategies for coping with triumphant digital platforms

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September, 2019, pp. 16-26.

Menaced with extinction as a result of a presumably inevitable “uberization”, firms have to speed up their digital transformation. This detailed study of approximately twenty French firms and organizations that have advanced toward this transformation shows that theories based on management fashions do not suffice to explain such a deep trend. The strategies worked out and applied by these firms are much more specific and thorough than specialists’ vague strategic recommendations. The facts of these cases even lead us to question whether the scare of uberization is a valid explanation, since it is, as shown, possible to survive from Uber, Airbnb, Booking and even Amazon. Various strategies can be adopted: confront these platforms head-on (even belatedly), avoid them, negotiate with them or become their vassals. Returning to the work of drafting an in-depth corporate strategy would signal a break with the rudimentary, mimetic strategies that prevailed during the past two decades of globalization.

The rhetoric of corporate management and its discourses about investment center around the issue of the digital transformation.⁽¹⁾ Should this situation be analyzed by borrowing the theories about “managerial fashions” (or “modes”)? Or does it shed light on a different sort of phenomenon? To answer these questions, the reports made of a series of debates organized with 20 French firms and organizations in the throes of this transformation have been examined. As we shall see, these reports do not hew the line that some consultants, opinion-makers and even academics have too soon adopted like a natural law of the digital age. Beyond any managerial mode, these reports attest to the much deeper work for drafting effective strategies for adapting firms to a new world order during the era of domination by the digital platforms, namely: GAFAM, NATU and BATX.⁽²⁾

The current changes driven by digital technology are ultimately having an unexpected side-effect. They are bringing back in-depth strategy-making, which mimetic approaches to management overlooked during the two decades of globalization. According to the prevalent discourse about management, it was necessary to do like everyone else in order to stay in the global race. With the rise of digital technology however, a firm must cultivate its specific characteristics.

⁽¹⁾ This article has been translated from French by Noal Mellott (Omaha Beach, France). The translation into English has, with the editor’s approval, completed a few bibliographical references. All websites were consulted in September 2020.

⁽²⁾ GAFA: Google, Amazon, Facebook, Apple and Microsoft; NATU: Netflix, Airbnb, Tesla and Uber; BATX: Baidu, Alibaba, Tencent and Xiaomi.

Toward the infinite firm?

Digital technology is no longer just a means for a firm to just sell more to the same customers in its usual field of business. It enables the firm to expand its scope of action, its business, infinitely. In “Gafanomics”, Fabernovel (2015) has argued that this capacity for infinite expansion is the prerogative of GAFAM, one of their four awesome “superpowers”. In fact, this superpower does not belong to GAFAM alone. The firms studied at the École de Paris du Management are also trying to draw profit from digital marketplaces.

Traditional entrepreneurs have always dreamed of using the confidence invested in them by their loyal customers to offer them new products or services (cross-selling or upselling), but they were aware of the limits of doing so in the physical world. So, it has not been hard for them to seize this opportunity offered in the digital realm. In fact, the twenty firms and organizations figuring in these reports are not stuck with their traditional business models. They know how easy it is to adventure into adjacent fields of business, which represent an opportunity for growth... and for the growth of competitors who might do as much and thus infringe on their territory. This is not the usual planned-for diversification or differentiation. It amounts to a generalized lowering of the barriers to market entry and thus raises several strategic and operational questions.

Digital technology has marvelously organized competition on a new, often planetary, scale. It has paid no heed to historical borders and barriers, whether those based on an out-of-date technolo-

Methodology

It is not easy to rationally explain why the phrase “digital transition/transformation” has met such success in managerial circles. The initial reaction is to place this phenomenon in the category of “*management fashions*” (ABRAHAMSON & FAIRCHILD 1999) or “*managerial modes*” (MIDLER 1986), an approach that suggests, by analogy, that we should analyze the discourses, or rhetoric, used by management.

The material underlying this research comes from reports of meetings at the École de Paris du Management, which, for more than twenty years, has organized debates on managerial practices. For these meetings, “practitioners” from firms are, following a strict protocol, selected and invited to present their point of view, a presentation followed by a wide-ranging debate with a small group of practitioners and researchers. A report of each meeting is then written.

The research presented herein draws on the twenty reports made of a series of conferences organized from 2016 to 2018 on *Transformations numériques [Digital transformations]*. These reports reflect as faithfully as possible the discourses of twenty French firms and organizations of various sizes and in different branches of the economy. What all them share is that they have undergone a significant digital transformation. To these twenty has been added a report (made in the same conditions) of a debate organized with the national secretary of the CFDT in charge of digital technology. This exchange with a labor union representative provides a contrasting view that crosses several branches of the economy. These reports are available on the website of the École de Paris du Management (www.ecole.org), and some are listed among this article’s references.

This article also borrows material from the summaries presented (in the same conditions) to researchers and several of these practitioners in early 2018 at the École de Paris du Management. This feedback vouches for the reliability of the reports.

THE THEMES

This analysis has taken shape around six themes that frequently crop up in the “digital vulgate”. They are presented as questions in the headings of this article. Although these questions to which the cases under examination respond do not exhaust this vulgate, they do sufficiently represent the most strategic points for evaluating whether or not a firm or organization has developed solid responses to issues along most of the axes of the digital transformation. The final heading, the only one that is not a question, is of a different sort since it presents the hypothesis backed by this article.

THE TWENTY FIRMS AND ORGANIZATIONS

Webedia (Fimalac), DINSIC (SGMAP), AXA, SoLocal, Compte Nickel, EDF, Ordre des Experts Comptables, Pernod Ricard, Lippi, Ooreka, Kamet, G7, AccorHotels, Kolibree, CFDT, Valeo, GRTGaz, Meta Consulting, Lagardère, Groupe Casino.

gy or on national regulations. A restaurant that starts home delivery extends the boundaries of its business. Although new sells are marginal at first, they might then climb considerably. Little by little, some restaurants will be drawing more income from catering than from sales on location. Specialized companies like Deliveroo have formed to help restaurants extend their scope of business. There are now even restaurants without dining rooms. By undertaking the crucial task of redefining the extent, or scope, of their market, most of the twenty firms studied herein have redesigned the purpose of their business, their promise to the world, their sales pitch. They have rushed to seize these new opportunities for growth.

A first example is Pernod Ricard, with its unique portfolio of 300 world-renown brands of liquor, each with a strong hold on the imagination of its consumers, some of whom are experts and aficionados.

For Alexandre Ricard and Antonia McCahon (2017), the Ricard Group no longer simply sells alcoholic beverages; it is now a “*creator of conviviality*”. What could amount to a fashionable marketing ploy refers, in fact, to very concrete strategies since the firm is now directly or indirectly involved in catering to, or even organizing, convivial gatherings. For example, it digitally tracks the movements of VIPs around the planet in order to be able to send them, at any time, the exceptional liquors, which cost several thousands of euros per bottle, that they would like to consume. Beyond this promise of service, the group has completely overhauled its organization by brand and product, a disruption for this traditional company.

SoLocal, formerly the yellow pages (Pages Jaunes), provides another example (REMY 2016). It initially sold advertising space in the popular printed version of telephone directories. It has now turned into a “partner

of digital visibility” for brick and mortar stores, large and small, by selling, along with the usual local advertisements, digital products developed by Facebook, Google and other firms, and thus becoming a sort of marketing agency for its customers. The new promise of service is very important since Solocal is no longer a dominant media company selling advertising space but a service-provider that has to, first of all, enter into strategic partnerships with digital media of a global class — a radically different positioning of the firm on this market.

Lippi started out by selling wholesale panels for fences and gates (LIPPI 2017). This French manufacturer was probably doomed, until two brothers imposed an in-depth strategy for a digital transformation. The sales pitch, “*the free spirit*”, now associated with the brand name Lippi, promises customers peace of mind by offering full solutions of security for the perimeters of their property. In this surprising turnabout, the company is also guaranteeing a quality of service to distributors and impeccable support. Its promise has been extended to very concrete products and business processes.

Like many hotels, AccorHotels sold “overnight stays” (NOWAK 2017), but it is now offering a new form of hospitality and is increasingly orienting its hotels toward their local environment via, in particular, the application AccorLocal. This app was developed following the acquisition of John Paul, a firm that offered high-end caretaker services. Once again, the company’s promise of service has widened its field of action and even led to redesigning its acquisition policy.

Finally, Kolibree, the connected toothbrush on everyone’s lips at the 2015 Consumer Electronics Show (SERVAL 2017), has now become a full-fledged player in oral hygiene. By entering the field of health insurance, it has potentially altered the way of paying for the device.

For strategic turnabouts of this sort, several prerequisites related to digital technology must be met. First of all, full, coherent, relevant information available throughout the organization must be provided to customers. This is usually an argument in favor of centralization. Secondly, the brand must invest massively in new digital “spaces” (social networks, websites with contents). This change can be likened to what firms experienced when television arrived, an event that marked the shift from “ads” to “commercials”. Some firms, like Coca-Cola, made the shift successfully and thrived; others, like Dubonnet (the champion of vermouth during the era of printed ads), missed the boat and soon took on water.

Not only does digital technology make it possible to go faster and more efficiently expand the scope of business, it has also made all this eventually possible at a limited cost in terms of investments. Selling new products to customers without making a major investment and thus with limited risks is, for sure, a dreamed-of opportunity for any entrepreneur, not only for GAFAM.

In an economy driven by mass consumption, entrepreneurs were obsessed with economies of scale, which result from producing huge series of products on specialized machines. This source of competitive advantages led them to overlook what economists have called “economies of scope” with the possibility of creating a globally profitable business from activities that are not very profitable per unit. This can usually be achieved by increasing the rate of using the company’s production capacity. With its emphasis on services, reactivity and consumer choice, the digital transformation makes economies of scope more attractive than at first sight. A taxi driver in a remote area can use downtime to deliver packages for DHL or medicine to pharmacies by simply joining different platforms at no investment cost. Digital technology can be used to, among other things, eliminate unproductive downtime and tap underused capacities. All this is, once again, evidence of the general lowering of market barriers and the expansion of the scope of business activities.

At a time when economists are worried about the indebtedness of nations and firms, the possibility of minimizing investments probably one reason why digital technology is so attractive. This is more than a passing fad; it makes us change our ideas about innovation. Innovation is now less oriented toward heavy investments, public subsidies, a technological disruption or the filing of patents; but increasingly turned toward disruptions in uses, the economic recycling of underused production capacities, or the offering of local (or even microlocal) services and solutions.

This dream of an infinitely expanding scope of business brings along several problems, economic and strategic. How much can a firm grow? How far can it expand its activities into new fields without losing its base? Will a single global player emerge in this defenseless, flatter world? Markets without entry barriers mean markets with margins that are narrow or even naught. Some pundits will see as a positive point in this situation the disappearance of rent-seeking, while others will point to the deviant effects (on innovation, for instance) as risk-taking becomes more difficult. Still others will emphasize how suddenly firms have adapted to the laws of this new marketplace, an adaptation that has invariably and concretely led to more flexibility or more precarious jobs in a gig economy.

The gradual extension of the scope of business, the breaking down of market barriers, the flattening of the world... all this naturally introduces a key player: online platforms.

Turning firms into platforms: Do or die?

By any criterion (market capitalization, growth, the power of brands, tax optimization, etc.), digital platforms (GAFAM, BATX, NATU...) beat traditional firms. To compete with these new dominant players, what can traditional companies do but become platforms and fight face-to-face with weapons of like sort? This is Jean-Louis Beffa’s (2017) advice, which

can be summed up as “Become a platform; do or die!” In agreement with this, Laura Létourneau and Clément Bertholet (2017) have even proposed uberizing government services before other players do so. Given that a platform of government services has become, in France, the core of the state’s digital transformation, there is no doubt but that this advice has been heard. In addition to the two general, classically recognized strategies (costs/differentiation), has a third been found?

Let us recall three particular characteristics of digital platforms. First of all, an online platform is a dematerialized marketplace. More than thirty years ago, researchers at MIT were telling us that this would be the most efficient way to organize markets (MALONE *et al.* 1986). Secondly, it is SoLoMo: social (owing to the comparison of users’ opinions, which builds confidence), localized (thanks to GPS) and mobile (constantly available via mobile phones). Finally and above all, a digital platform is decompartmentalized; it causes retailers, wholesalers and even nonprofessionals to enter into competition with each other.

As the following three cases show however, the idea that becoming a platform is the only antidote against uberization is a matter of discussion.

The firm G7 is the very symbol of a uberized firm. Should it have become a platform, and would this have prevented its uberization? Nothing is less certain! G7, which is sparse with communications, was already a platform before Uber was born. It was not a taxi company but a reservation center that coordinated the activities of the 8000 self-employed drivers in its ranks. These taxis were already geolocated; and customers’ telephone calls were already being automatically processed without human intervention. G7’s efficient infrastructure already combined telephone and computer technology. Furthermore, it had one of the very first applications available on iPhone for hailing a taxi; and Steve Jobs congratulated it personally on this in 2008. So, this company was an efficient, operational platform dominant in its market. This has not kept it from being the very example of a uberized firm. The argument “Do or die” is not, therefore, very convincing in this case, even less so when we examine how G7 has coped. It has concentrated its efforts on factors that, in the main, have little to do with digital technology. It reviewed its sales pitch, which used to be oriented toward the very profitable market of firms that had subscribed to its services (to the detriment of individual passengers). The brand was weak; and customer services were basic and inconsistent. G7 managed to rebecome competitive by mobilizing its 8000 self-employed drivers, who are strongly attached to their rights, in order to create a customer-oriented community of shared interests. It convinced the drivers to place an elegant band of colors representing the G7 brand on their cars; and it differentiated the services offered into a dozen types of use (economic, luxury, electric vehicle, car-pooling, etc.). In this de-uberization, the effort put into digital technology consisted of correcting the first application’s tactical errors (for free versus

for pay), rewriting the app (using Uber’s standards) and drawing attention to its features. This rewriting of computer code did not represent a major effort given the experience previously acquired by the company and its already existing information system. Contrary to what is taken for granted, G7 is evidence that “de-uberization” is possible (even during a late stage). This did not mean becoming a platform, since existing operations already involved playing the highly computerized role of middleman or broker. Furthermore, when repositioning itself in the market, G7 managed to stake out a position as a reservation center in more than a hundred cities in France (4500 affiliated taxis) and several cities outside the country (17,000 affiliated taxis). While taxis suffered when Uber and car-for-hire services entered the market, the uberization of G7 was temporary and would ultimately be an advantage.

A second case is AccorHotels, a global network of 4000 hotels with various names and ranging from unpretentious to upscale. Among its many activities, this group operates a website for reservation in its hotels (NOWAK 2017). This site was already competing head on with big reservation platforms (such as Booking and Expedia) and with platforms for alternative accommodations (such as Airbnb). The digital transformation started with a “purification” of its reservation platform. The website was given a new, more suggestive name: AccorHotels.com. The Group then turned 25% of its hotels into subsidiaries in order to sell them off and recenter its business on a single task as an operator in the hotel business. This recentering strategy has little to do with the digital transformation since all the major American operators had done as much before the advent of digital platforms. A second — more offensive and much more ambitious — part of the Group’s program was its general plan with 115 proposals that, reaching down to an unusual level of detail, were managed worldwide. This plan called for innovative services, novel “experiences of hospitality” and the opening of hotels toward their urban environment. AccorHotels is trying to be recognized as a leading player in local caretaker services thanks to its knowledge of local areas. This offensive strategy can be seen as a “deplatforming” of its activities with the goal of marking a difference with the dominant player, Booking.com, and other platforms. Nonetheless the Group has continued working with them — something seldom observed since a platform usually organizes competition among members but carefully avoids having another platform as broker. This mixed strategy combines being a platform with differentiation, the first of these probably being the easiest to develop and, therefore, to imitate and, eventually has less to do with differentiation.

The third example is certified accountants (SAPHORES 2017), a profession that, thanks to its efforts over more than ten years, has managed to standardize electronic transfers of bookkeeping data. These efforts led this profession to the United Nations and the drafting of international standards. It was thus easier for all French accounting services (banks, the French Treasury, etc.) to adopt these standards. Certified accountants have set up a platform (Jedeclare.com) where more

than two million French firms upload and download information. The only problem is that this platform has not raised any income for its inventors, at least not yet. This example does not fit into the digital vulgate, which presents successful platforms as sources for generating considerable income.

Since a platform is a broker, an intermediary, if everyone sets up one, everyone will become an intermediary. What would be the sense of a world peopled with brokers but deserted by manufacturers? This question does not seem to bother digital pundits, even though industrialists in the panel were concerned with it. While highly aware of the platforms as a powerful business model, they had enough confidence in their ability to cope with the big platforms — under condition that competition not be skewed due to taxes and social regulations (different for platforms, as is the case in competition with amateurs without a professional status and with no constraints) and, too, that they organize their business so to be closer to customers and to attract and retain their full attention.

Capturing the customer's attention: The mother of all battles?

Capturing the customer's attention is an ever increasing preoccupation. By facilitating the solicitation of customers and augmenting their choices, digital technology has fostered the war for attention theorized by Herbert Simon. In 2009, 18% of purchasers on Amazon had directly started their product search on the Amazon website or via Google, which immediately redirected them there. In 2016, this statistic reached 50%, a result that leaves little room for anyone else. Attention has been said to be the ultimate stake in the digital economy (BOULLIER 2016), a point that firms, in particular those that have advanced the farthest toward the digital transformation, them, have clearly understood.

Fortunately, the reality of business is much more often "multilocal" than global. Uber is not actually global; and not all cities interest it, whence the possibility of niche strategies. For instance, G7, a Parisian company that had trouble attracting members outside the greater Paris area, has announced its presence in more than a hundred cities elsewhere in France (4500 affiliated taxis), which represents half of its network in the Paris area. In addition, it is spreading to parts of Europe. The fear of Uber seems to be leading self-employed taxi drivers to rally around G7 to survive.

This point is of special interest to the traditional firms that, for a long time now, have organized complex processes in order to tap the potential of local markets and of market subsegments. They are already equipped to implement complex, multiple strategies embedded in each other. However it is complicated to pursue a combination of strategies adapted to the roughness of the fields of operations, and even more complicated to explain it in simple language. This is a source of recurrent criticism, both in- and outside the firm. The big online platforms, many of them in a single business,

are champions of "blitzscaling"; they make promises to customers that are easy to understand. Will they be capable of devising a more complex business model so as to position themselves on market subsegments? This might be the key question in the quarrel between the "ancients and the moderns".

Casino provides a fitting example (BOURGOIS 2018). This giant among retail chains includes stores with traditionally recognized names (Casino, Monoprix, Franprix, etc.) in suburban or downtown areas, upscale or discount (such as Leader Price) as well as online businesses (Cdiscount, its online subsidiary) that are actually withstanding Amazon. It comes as no surprise to see the Casino Group form a partnership with Amazon; but it is more surprising to see Amazon in a partnership that is based on the very core of its own business activities: logistics. Since September 2018, the customers of Amazon Prime in Paris can do their online shopping and benefit from rapid delivery for free by Monoprix. Monoprix sees to the last-mile logistics for Amazon, the champion in all categories of logistics. This surprising success seems to reach beyond the most optimistic expectations. Amazon, which was having difficulty on this market, came to realize that it could tackle certain market segments by forming a partnership with another, better qualified firm, even in the fields of competence where it excels, such as logistics. Imagine how much attention must be paid to details in order to study the opportunities derived from such a partnership and the ways to make it last. Casino, a group with stores of varied sizes, is used to this sort of unstable situation, while Amazon is learning to cope. Does all this come at the cost of a change to its strategic culture?

A technical infrastructure platform: An idea too evident?

A business platform model does not seem appropriate in all situations. Might this not also be said of the technology related to the concept of an "online platform"? To make business grow, in particular when the intent is to extend the company's scope of action, it is necessary to know your customers and, therefore, to have relevant, fresh, full, coherent data on them.

As Yves Caseau (2016) has pointed out, firms have long considered computer technology to lie outside their core business and, as a consequence, have subcontracted many information system activities; but this situation is now changing. According to this representative of AXA, all firms have to become software companies for a very simple reason: the ability to bring an innovation fast to the market now directly depends on the ability to code, either because the code is integrated in the innovation or because it is essential to the very process of placing a product on the market. The ability to produce an ongoing flow of software code in collaboration with other players in- and outside the firm means setting up a joint "vessel" — for want of a better word, a "technical infrastructure platform".

According to Alexandre Ricard, a firm absolutely has to have available consolidated data to expand the scope of its business to customers (RICARD & MCCAHOON 2017). There is no doubt that it must strongly centralize these data. But how to proceed in a traditionally decentralized group? For Ricard, the solution is to use a cloud as a platform (technical infrastructure) where customer data are concentrated. He thus signed a contract with a specialist in this field, Salesforce, an American company. This argument is identical to the one used at the turn of the century to convince firms to adopt enterprise application software (EAS) for resource planning.

While questions can be asked about the need to turn a business into a platform, it seems inevitable and obvious that a platform has to be set up for the technical infrastructure. All reports say as much. Schmidt Group, which sells custom-made kitchens, naturally tends to see itself as an expert in logistics who assembles elements furnished by its partners and suppliers (LEITZGEN 2016). The technical infrastructure underlying these movements or flows is essential to its performance. Lippi set up permanent interconnections between all its personnel via Google+. In all cases reported, coping with the digital transformation soon became complicated if the firm lacked a minimal technical infrastructure, one more or less resembling a platform. The modernization efforts made by the public administration (PEZZIARDI & VERDIER 2016) have also implicated it in developing such a platform, a technical infrastructure built around open data, APIs and freeware.

A new frontier in digital technology is now opening before us. How to manage the mix of the physical world with the digital realm through a customer's "phygital" experiences, which profit from the best of both. The Casino Group recently launched a phygital experiment by installing Cdiscount "corners" in a few suburban Casino hypermarket stores. Customers thus benefit from the advantages of online purchases and neighborhood services: on the one hand, an infinite choice at the lowest prices and, on the other hand, the advice of the Casino salespersons assigned to these new spaces, where certain products in demonstration can be tried out and touched (DESHAYES 2019a). This experiment has been very successful, but it was necessary to establish communications between the information systems of these two businesses, which had nothing in common and have to remain operational in their respective fields. Bridges had to be built fast. The solution settled upon involved a platform of specialized software for connecting the two systems.

The recourse to a sort of technical platform seems necessary, but the devil is in the details. In fact, the technological principles to be used vary and are barely compatible with each other. Furthermore, they might hide quite different interests, whether in- or outside the firm. How to be sure that firms are sufficiently aware of the issues in terms of power? Or that they put in enough effort to work out a shared view of difficulties so as to attain the expected results? The popularity of the word "platform" might have a devious effect, by making us

believe that everyone agrees on the target and on the way to reach it whereas too few options or features have been worked out in detail (DESHAYES 2019b).

Which strategy for the platform era?

This topic of online platforms has not yet been exhausted. If becoming a platform, as some pundits advocate, is not a viable strategy for all firms, what are the alternatives in terms of strategy? To compete with the new rulers of the world, many firms prefer strategies that reflect a probably more pragmatic approach. These ASTUTE players pledge a form of allegiance, tacit or explicit, to the new rulers and thus avoid direct confrontation. In contrast, other businesses accept to share with the platforms and become PARTNERS; while still others, CLIENTS, simply seek to protect their own positions by paying the new rulers. Figure 1 presents these various approaches.

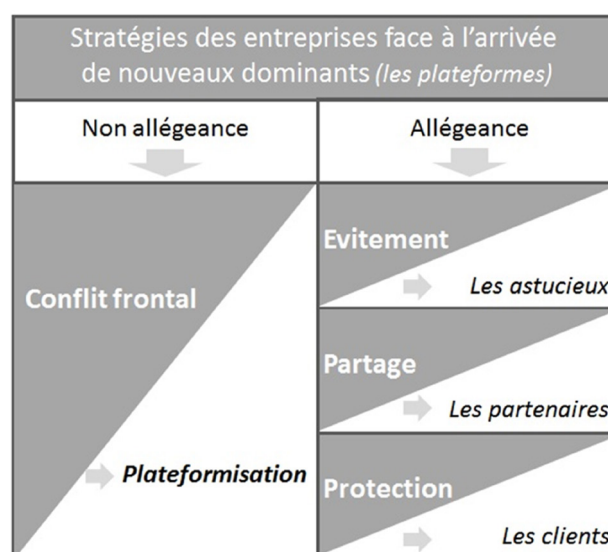


Figure 1: Corporate strategies for coping with dominant newcomers (online platforms)

The ASTUTE, like Webedia or Ooreka, eat high off the hog, since they produce contents for the purpose of ranking firms at the top of search findings, in particular on Google. Once capturing the attention of cybernauts, they resell advertising on their own pages to other firms. Their strategy is to gather the crumbs that fall from the tables of the wealthy lords of the Web, crumbs enough for them to thrive with two-digit growth rates. The only disadvantage: the platforms are no fools. Every eighteen months, they modify their algorithms to deal out a new hand of cards and keep these clever players from installing their image in the minds of cybernauts. The value of a French unicorn, Criteo, dropped 28% in two hours of trading on the stock market simply because Apple, by changing its algorithms, forced the company to overhaul its business plan. Véronique Morali (2016) explained how hard it was to put up with so much stress. The company's needs in terms of skills could not be assessed, nor could business models be

designed for six months down the road. The solution? Powerful contents and extreme agility in both skills and strategies.

PARTNERS, like SoLocal, AccorHotels and Casino, are too big to live on crumbs. They have chosen to enter into a compromise with platforms bigger than themselves. Owing to their strong (often local) positions in the physical world, they negotiate partnerships with the big platforms. These partnerships are grounded on a balance of power, which the platforms will try to erode. Pages Jaunes initially held a strong position based on its field network of a thousand salespeople. In parallel to its partnership with Solocal, Google is trying to establish a local presence with the help of other partners — a threat to Solocal's strong hold.

CLIENTS, like the Schmidt Group or Pernod Ricard, try to improve their online visibility through purchasing advertising spaces, keywords, etc. What threatens them is, quite simply, inflated prices. When a keyword attracts attention, bidding shoots up. For instance, a keyword bought at 40 cents a click two years ago is now worth four euros. An extreme case: the keyword *SOS-Plombier-Paris* is now worth 40 euros on weekends. At stake for these clients is to invest enough in contents so that they are sure references that the platforms have to list correctly without being able to force them to make the highest bid during auctions.

A control over social marketing and programming is, it turns out, the key to success (DESHAYES 2014). After having centralized its data and improved its knowledge of customers, Pernod Ricard's strategy was to no longer let out to communication agencies the procurement of advertising spaces and keywords. It was determined to exercise in house a control over marketing skills, the creation of contents, data analytics and the purchase of advertising spaces.

Whatever the positions adopted, firms all have to learn to swim among sharks. Platforms are on the alert to grab a valuable position, especially if it is held by one of their partners. Besides position-based strategies, there are, therefore, movement-based strategies (agility) — a sort of asymmetric cooptation with the overbearing players on the other side. Competition has grown in intensity; it is massive and generalized. Maurice Lévy (2014) said that he only met bosses who were afraid of being uberized. In the past, market barriers served to generate excessive margins that allowed for reinvestment in riskier activities. This situation is now vanishing. All markets are now lastingly driven by extreme competition. Traditional corporate managers are, understandably, ill at ease, since they have to keep swimming among the sharks. This menace has apparently reinforced, in many firms, their resolve to control and "insource" certain skills and domains of competence that are not part of their core business. This contrasts with the subcontracting and outsourcing policies hyped during the 1990s.

Know thy customers: Behind all sorts of screens?

When a firm sells its products to distributors, it knows nothing about end users. The distributor forms a sort of screen between it and its customers. Digital technology offers all manufacturers the opportunity to get to know the consumers of their products via social networks, online communities, and the data gathered on purchases and uses. The manufacturer can thus skirt around distributors without upsetting them, this point being much more important to small firms like Lippi than to big groups like Pernod Ricard.

During each campaign for promoting its 70 brand names, Pernod Ricard used to hire an advertising agency to bring a sample of consumers together in focus groups, have them test various scenarios or concepts, and gather the consumers' opinions, all this part of a process for making the right choices. With the customer information accumulated thanks to digital technology, Pernod Ricard, now persuaded that it knows its customers better, has done away with focus groups.

The brand is also an essential element in a digital approach, as the shift is made from advertising to a plebiscite (DESHAYES 2014). On social networks, there is talk about contents, communities, even interactions with customers. Glenlivet, a brand of whiskey belonging to Pernod Ricard, made three special brews, each using a specific blend. The thousands of "followers" fond of whiskey were asked to come test these brews during events organized in their vicinity and post their comments on the social networks. Mastering the community of customers around a brand helps to strengthen bonds across the screens set up by distributors, search engines or, tomorrow, conversational robots like Amazon's Alexa.

Creating contents is definitely now an indispensable task that should be performed, at least partly, in house. It weighs heavily on budgets, especially in small and medium-sized firms (DESHAYES 2019b).

Conclusion: Back to strategy-making

One of the lessons drawn from analyzing these twenty reports is that corporate leaders are now directly involved in major maneuvers in the digital realm. During the debates organized at the École de Paris du Management in small groups behind closed doors, these leaders talked about their practices with regard to matters that used to be considered "technical". Their involvement in the digital transformation was confirmed by Marylise Léon from the CFDT (2017). The strategies they presented were quite unusual, subtler than the vague solutions mouthed by the many consultants and pundits who wield influence in the digital realm. This is evidence that these firms, which have advanced to cope with the digital transformation, have given thought to strategy-making.

This finding is not to be taken for granted after the decline for more than two decades in strategic thinking (BAUMARD 2014). This trend did not spare firms, where anything resembling a strategy seemed invariably turned toward globalization, standardization, massive outsourcing and so-called “good practices” regardless of the firm, its sector, environment or competitors — a heresy. Nowadays the focus has shifted to innovation, the customer experience, new business models and repositioning in order to cope with the new dominant players. This mimesis in strategy-making is ebbing in favor of the difficult, laborious tasks of introspection and projection, a prerequisite for drafting a strategy that is truly original, a criterion for judging its quality. This shift signals a break.

It would, therefore, be wiser to use the plural and talk about “digital transformations”. This might help keep us from thinking that there is only one method or one tool for coping. The plural form has the advantage of suggesting that we stand back from the theory of managerial fashions (or modes) in the sense of Midler (1986) and of Abrahamson and Fairchild (1999). In effect, these twenty firms, already engaged in the digital transformation, do not answer to the criteria used by these authors. First of all, what is at stake is not a management tool as such but rather a (very imprecise) goal to be reached. Secondly, this phenomenon is not transitional but has lasted, under various names, since the simultaneous advent of the Web and mobile telephones more than twenty years ago. Thirdly, and independently of the twenty firms studied herein, 100% of firms now claim to have started their digital transformation. This claim does not, however, correspond to a major characteristic of fashions, namely that the first to adopt a fashion starts to give it up when the masses start following it. Finally, and once and for all, the corporate strategies studied herein are much more elaborate than what the digital vulgate has suggested. This is evidence that strategies are being customized, if only in the rhetoric or discourses, evidence that does not conform to the standards typical of fashion victims.

Far from being fashion victims, some managers are, as the literature has shown, using popular tools cynically or pragmatically, without any illusion about their efficiency, in order to rally around a common set of specifications the staff (GILL & WHITTLE 1993) or stakeholders, including shareholders (STAW & EPSTEIN 2000). This use of “management fashions” by corporate leaders is more political than operational, as we can see when leaders brandish the digital transformation like a standard for mustering forces or as a symbol of protection.

The digital transformation has been continuously advancing for two decades now. It has ultimately been used as a self-evident symbol of continuity, a link between past and future. The king’s standard rallies troops, both his own and those of allies who march under their own banners, and, too, the mercenaries in his pay. In the cases under discussion, the firm can be seen like a greater corporate area encompassing its ecosystem. Raising the standard of the digital

transformation is crucial for reassuring the troops and mustering support in the financial markets. Some big French groups have recently sought to raise billions in order to speed up their “digital transformation”. This signal to the market has been well received! Not only do investors expect strong resolve on this topic, but also they do not tend to look closely at a firm’s plans and characteristics. Besides, the CEO does not want to say much about them — CEOs, like politicians, are disappointing when they announce too little. For them, these billions are no more binding than a promise made by a politician. They fall into a huge bag that, given the wide-range and imprecision of the phrase “digital transformation”, can cover almost any corporate expenditure. Even the concept of an investment seems relative, a matter of convention.

Like the “energy transition”, the digital transformation (or transition) tends to serve as a standard for management to raise. CEOs brandish it to tap important resources and ward off, at least for a while, criticism. It is not certain that they are all convinced about the actual effectiveness of hackathons, bootcamps, design thinking, flex offices, agile methods and organizational agility in general. Nonetheless, they do not hesitate to bring these topics under the protection of the standard they bear. What is the goal? To sustain an impetus, in- and outside the firm, an energy to be tapped while the demanding, difficult work of introspection is having an effect. After all, business has to carry on during this process. As a symbol of stability, the standard thus raised is a source of legitimacy for the leader. This has another political advantage for managers. In effect, this standard — by waving in the same way over various operations in the digital transformation — blurs the glaring contrast between current management fashions (agility, collaboration, innovation, customer experience, platforms, data centralization, artificial intelligence, etc.) and those of the recent past (value creation, performance, governance, core business activities, management by objectives, business processes, scorecards, cost-cutting, etc.). Yesterday’s fashions will never be evaluated, and no one will mind that. The standard of the digital transformation is not unrelated to making this shift gradually and painlessly.

This political usage might ultimately place the digital transformation in the category of managerial fashions in a broader sense, inside (GILL & WHITTLE 1993) or outside (STAW & EPSTEIN 2000) the firm. However it must not be shut up in that category, since it is apparently a very useful key of interpretation for the firms that sincerely want to try to understand how the world is evolving and to adapt to new social and societal aspirations in order to find therein a source for their sustainable development.

Those who wave the standard of the digital transformation only as a political flag risk being unequipped to cope once the time saved (after taking account of all the time wasted in pursuing fashions such as artificial intelligence or blockchains — pursuits poorly controlled and poorly articulated with a strategy) reveals to everyone the lack of depth of the transformation actually accomplished. Solocal is of

interest in this respect. The aforementioned CEO has, since 2016, been forced to resign for several reasons, in particular because his strategy did not deliver the predicted benefits. But the digital transformation is still on the company's agenda. His successor has assumed the same strategy of partnership with big platforms but is apparently delving into the details of how to execute it, this being the ultimate criterion for assessing whether a strategy is the right one — but that is another story than the present study of corporate discourses and rhetoric.

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Systemic disruption and ambidextrous program management: The case of electric buses

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Technological developments (mainly digital), worldwide competition stemming from innovations and societal pressures on issues related to the environment has created a context where organizations are faced with major, sudden transitions. Relating the literature on innovation, ambidexterity and project management, this article describes these “systemic disruptions” and, using the concept of “ambidextrous program management”, proposes the principles for coping with them. With the help of these concepts, a typical case of such a transition is analyzed, namely the electrification of the urban bus service in Paris. It helps clarify the issues raised by such transitions and the forms of project management capable of responding to them. An explanation is made about how these forms compare with the processes adopted since the 1990s to manage innovations in firms.

Disruption, systemic innovations, ambidexterity, the change of scales... management’s terminology has, for several years now, been enlarged with many new ideas referring to the transformations that firms are now undergoing. Beyond fads, the concomitance of technological (mainly digital) opportunities and social pressure (related to environmental issues in particular) is creating a context that deeply alters the nature of the innovations that firms have to manage. This article seeks to accurately describe “systemic disruptions” and analyze how they require implementing new forms of organization, which we call “ambidextrous program management”.⁽¹⁾

After the first part of this article on what, in our opinion, are the original characteristics of these disruptions, an empirical case will be analyzed in transportation and mobility. For several years now, this sector has been a center of focus owing to the major changes experienced by the automobile industry, ranging from electric vehicles today to driverless vehicles tomor-

row. This is not the only industry however. Urban transit is undergoing changes just as important. We shall examine the most ambitious program in Europe for deploying electric busses, namely the RATP’s (Régie Autonome des Transports Parisiens, the greater Paris area’s transit operator) electric bus program, which has characteristics that fully match those of a systemic disruption. We shall use to this case to suggest general principles for managing transformations of this sort.

Systemic disruptions

Systemic disruptions (VON PECHMANN 2014, VON PECHMANN *et al.* 2012) are transformations with five characteristics:

- the radical nature of the disruption;
- the scope of the disruption and its perimeter;
- the scale of the projects for handling it;
- the pace of the expected transition; and
- the necessity of making the transition while pursuing current activities.

Let us look more closely at these characteristics.

⁽¹⁾ This article has been translated from French by Noal Mellott (Omaha Beach, France). The translation into English has, with the editor’s approval, completed a few bibliographical references. All websites were consulted in September 2020.

The most obvious is the **RADICAL** nature of the disruption. The switch from internal combustion engines to electric motors leads to questions about core business activities, which have been developed around transportation based on internal combustion engines. In the literature (DANNEELS & KLEINSCHMIDT 2001, CALANTONE *et al.* 2006, ABERNATHY & CLARK 1985), this is a first criterion for differentiating innovations: the contrast between an incremental innovation, which preserves the integrity of the existing system of design and manufacturing (“*design dominant*”: ABERNATHY & UTTERBACK 1975 & 1978) and a radical innovation, which makes a break with the existing architecture and components.

The **SYSTEMIC SCOPE** (TEECE 1996, CHESBROUGH & TEECE 1996) of these changes means that they are being deployed in a wide range of business activities, beyond a single product over which the firm exercises (partial) control. The switch to electricity affects not just the design of an efficient vehicle; it also has implications about the new value chain for economically producing components (Batteries immediately come to mind), the infrastructure for doing so, the learning processes that users and operators must undergo (ranging from the individual customers who learn to drive the new electric vehicles to transportation management services, in particular transit authorities), and the modification of traffic regulations in urban areas (the goal being to decrease pollution and establish regulations about the emissions of vehicle fleets).

Managing systemic innovations is a major challenge since the firm involved has to adapt a whole ecosystem in order to transform the context so that its product can be efficiently used. For instance, the slow installation by public and private economic agents of stations for recharging batteries accounts for the difficulty of rolling out electric vehicles in most European countries.

Owing to this second characteristic, the companies most likely to make systemic innovations are mostly big firms well placed in their sector. They alone can push or pull their industrial and regulatory environments (TEECE 1996, CHESBROUGH & TEECE 1996). Apart from a few exceptions in California or China, this is outside the reach of startups.

The third important characteristic is the **SCALE**. To continue with examples from the mobility sector: prototypes of electric vehicles have existed for decades. What is now on the board are the changes needed for a massive rollout. The goal is no longer to deliver a proof of concept or to conduct a local experiment but, instead, to pass to a large-scale rollout “in real life”. This scaling up has implications for making investments and overhauling manufacturing systems.

The fourth characteristic is the **SPEED** of the transition. Many of the programs on mobility conducted in recent years have set ambitious delivery dates that make it urgent to undertake major changes. The case of electric

mobility is emblematic when we compare the acceleration of history since 2010 with the speed during the previous thirty years of changes in small, cautious steps at a slow pace.

The fifth characteristic is the **PURSUIT OF CURRENT ACTIVITIES** while managing the transition. A systemic disruption (which, as pointed out, is usually steered by major players in the sector) has to be managed without impairing current operations: “During renovation, the store will be open.” This serves as the grounds of research on ambidextrous organizations (BEN MAHMOUD-JOUINI *et al.* 2007, DUNCAN 1976, TUSHMAN & O'REILLY 1996 & 1997 cited by BIRKINSHAW & GUPTA 2013). It has focused on how a single organization can carry on with business as usual while exploring the ways to cope with a systemic disruption.

Ambidextrous program management

The combination of these five characteristics accounts for the originality of the transition studied herein under the heading of “management of systemic disruptions”. The globalization of the competition stemming from innovations and giant Chinese or American firms, the environmental emergency and the maturation of technological capacities during recent decades form a context favorable to the multiplication of such transitions.

These systemic disruptions challenge the processes of design and R&D that firms adopted during previous decades. Firms have long made efforts to develop their apacity for innovation. The landscape of industrial organizations has thus been deeply modified since the 1990s. The development and empowerment of project management (MIDLER 1993 & 1995), projects portfolio management (COOPER 1990), concurrent engineering (PRASAD 1996, SOBEK *et al.* 1999), multiple project management and the modularization of products (CUSUMANO & NOBEOKA 1998, MANIAK *et al.* 2014) have been conducive to the diversification of product lines thanks to the sharing of components and the distribution of innovation throughout the value chain. Innovation units now located upstream in the manufacturing process can explore possibilities (BEN MAHMOUD JOUINI 2015); and units of advanced engineering can use demonstrations to prove whether an innovation is valuable, help a new technology mature and prepare “riskless” solutions (MIDLER *et al.* 2012). Finally, the phase of development focuses on solutions that have been made feasible by optimizing the “golden triangle” of quality, costs and production time. These organizational models for design and their associated methods — “*concept knowledge*” (HATCHUEL & WEIL 2002, LE MASSON *et al.* 2006) and “*design thinking*” (BROWN 2009) upstream in the process along with concurrent engineering and computer-aided manufacturing (CHANG *et al.* 1991) downstream during development — have reshaped many firms. They are intended to rationalize the phases in a project upstream (exploration, prospecting, brainstorming and the maturation of innovative solutions)

and then downstream (product development, speed, quality and costs). These design-based models effectively develop a flow of innovations (via dominant design) and protect (owing to the sequences and, thus, the compartmentalization they introduce) exploratory activities upstream in product development. A head-on competition between long-term, uncertain projects and short-term development projects would be fatal to the former, since the latter are by definition more profitable in the short run, and it would soon suck up a firm's financial resources (BOWER & CHRISTENSEN 1995, CHRISTENSEN 1997).

However these models have two limits for the management of systemic disruptions. On the one hand, key questions are not, given the compartmentalized division into sequences, addressed upstream; and this delays the actual attainment of the objectives set for the rollout of new products. Typically, systemic variables are seen as important only once the product is working in real life (VON PECHMANN 2014, VON PECHMANN *et al.* 2016), whence questions about how to switch to development on an industrial scale. These questions about scaling up are not usually addressed in "labs" (ALCHET & MIDLER 2019). On the other hand, the innovation/development sequence (and compartmentalization) hampers the sharing of knowledge throughout the whole process, upstream and downstream, from those who develop products for tomorrow to those who prepare the solutions for the day after tomorrow.

Just as the concept of concurrent engineering modified the methods and organization of development engineering during the 1990s (CLARK & FUJIMOTO 1991), systemic disruptions lead to overhauling both the models of corporate organization and corresponding theories in the managerial sciences. Herein, we would like to contribute to this new model of ambidextrous program management. This form of program management has the following three specific characteristics, which make a break with projects portfolio management (PPM):

- First of all, ambidextrous program management is both strategic and complex. It is intended for managing a systemic disruption, as previously defined, in

"megaprojects" (FLYVBJERG *et al.* 2003), like the Grand Paris Express (PRAGER 2019). Projects for developing electric mobility and driverless vehicles in the automobile industry have to raise billions of euros over several years. They represent a challenge for the industry's usual business-to-customer model, its technology and all players along the value chain.

- Secondly, this sort of program management involves multiple, heterogeneous projects (for new products, services, infrastructures, business models, ecosystems...) and objectives (exploratory or operational) with different horizons (short, medium or long terms). This heterogeneity is the reason for borrowing the word "ambidextrous" from authors who have defined it in strategy-making and the theory of organizations (TUSHMAN & O'REILLY 1996). This handling of a projects portfolio is different from traditional PPM, which compares projects classified in homogeneous categories (R&D, advanced engineering, product development) and tracks their advancement from one category to the next following regular reviews at "stage-gates" (COOPER 1990).

- Thirdly, the projects in an ambidextrous program are very interdependent and thus require special efforts of coordination. This accounts for the word "program" as defined in the literature on project management (ARTTO *et al.* 2009, MAYLOR *et al.* 2006). This sort of management tries to organize a concurrence in various aspects of the program in order to accelerate the scaling up to the global system (e.g., by simultaneously working on the variables "infrastructure" and "vehicle" in a program on electric mobility: VON PECHMANN 2014), speed up the transfer of knowledge between projects of different sorts, and foster the pooling of solutions and shortcuts between processes up- and downstream in the "funnel of innovation", something that PPM with its categories cannot do.

Figure 1 depicts this passage from a classical sequence-based program to the concurrence fostered by a global program, as in the case of electric vehicles, where the mismatch between product development and the system of mobility was, from 2011 to 2014, a major

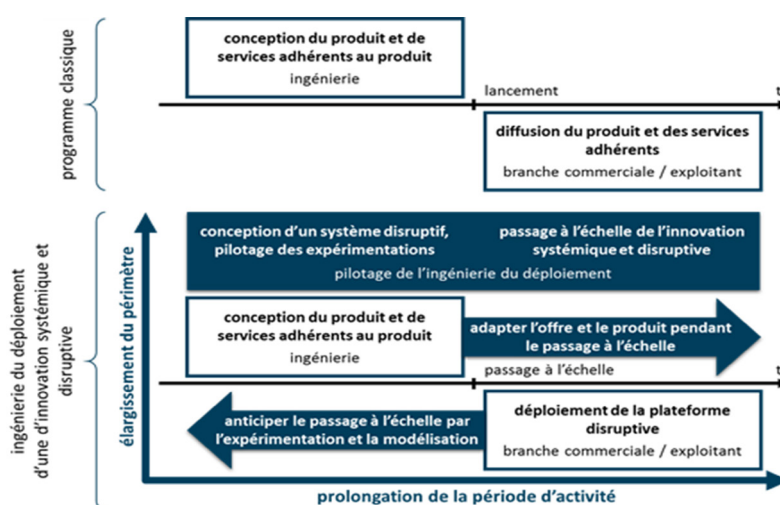


Figure 1: The rollout of a program for a systemic, disruptive innovation (VON PECHMANN 2014, VON PECHMANN *et al.* 2015)

impediment to this market's rapid growth (VON PECHMANN 2014). It is worthwhile adopting "rollout engineering" (VON PECHMANN 2014, VON PECHMANN *et al.* 2015) to simultaneously explore, prepare and implement the various aspects of such a transition. This can be done by detecting problems as best possible so as to find the best compromises for settling them.

To discuss an ambidextrous program and its principles, let us now examine a typical example, the RATP's Bus 2025 Program, a flagship for the rollout of electric busses in Europe and the world.⁽²⁾

The Bus 2025 Program

The initial challenge: A massive, sudden transition

In December 2013, Île-de-France Mobilités (IDFM, the transit authority for the Île-de-France Region, which includes Paris) made the decision to stop the RATP from acquiring nonhybrid diesel busses: "No procurement 100% diesel for the motorized rolling stock can be notified as of the current meeting." The IDFM's council also decided "to undertake actions for the transition of Île-de-France's fleet [of vehicles] toward a material that is all-electric or 'GNV Bio Gas'".⁽³⁾ This decision forced the RATP to respond to what thus became an urgent

situation. So, the transit operator switched to hybrid busses, a controllable technology not at odds with current operations. This switch represented a challenge because it had to be made massively and speedily. By 2019, the RATP had one of the biggest hybrid bus fleets in Europe, more than one thousand vehicles.

Though realistic in the short run, this choice entailed a transition. The extra costs for maintenance and a partial electrification of the drivetrain would hardly be offset by the savings on motor fuel over the life of a hybrid vehicle. Such vehicles were not, therefore, a lasting solution — a conclusion widely shared in the professional milieu. So, the RATP faced two possibilities: either continue operations as usual or undertake a radical transformation. Continuity meant natural gas, a familiar, industrially mature solution that could be applied in a way similar to the operation of diesel busses. The radical transformation would be to switch to electricity.

Pierre Mongin, CEO at the time, decided on a full transformation of the RATP's bus fleet, a decision that gave birth to the Bus 2025 Program. Publicly announced on 17 March 2014, this plan was extremely ambitious at the time. It aroused enthusiasm among users who take the bus but skepticism among several experts and manufacturers. Converting such a large bus fleet in such a short time to such an untried technology would be a major, even colossal, industrial challenge. Many voices were heard both in- and outside the RATP that expressed doubts about the program's feasibility. This program had all the characteristics of a systemic disruption, as previously defined.

Let us now see how this massive, sudden disruption is radically transforming the RATP's activities as a transportation operator and how this transformation reaches well beyond the firm's usual core activities.

⁽²⁾ <https://www.ratp.fr/groupe-ratp/newsroom/bus/bus-2025-lambitieux-plan-de-la-ratp-pour-un-parc-100-propre>

⁽³⁾ Minutes of the meeting of 11 December 2013, n°2013/548, of the Syndicat des Transports d'Île-de-France (STIF). At the time, the IDFM was called the Syndicat des Transports d'Île-de-France. In France, GNV (natural gas for vehicles) is the same gas distributed to households for heating or cooking. It is mostly methane.

Table 1:
History and planning

11 December 2013	Decision by STIF (IDFM) to halt the purchase of diesel busses and to replace the oldest diesel vehicles with a large fleet of hybrid busses.
14 March 2014	The Bus 2025 Program presented to the RATP's governing board.
17 March 2014	The Bus 2025 Program officially announced.
17 August 2015	The TECV Act on the energy transition for green growth requires that at least 50% of busses have low emissions by 2020; and 100%, by 2025. Local authorities may designate low-emission zones (ZFE, formerly ZCR).
6 December 2016	STIF's decision: " <i>an objective for a clean bus fleet in 2025 in the most polluted urban zones</i> ".
11 January 2017	The decree implementing the TECV Act: for the RATP, 50% of busses are to run on electricity or natural gas by 2020 and 100% by 2025.
11 October 2017	Under the Paris Climate Plan, the city of Paris announces the end of vehicles with internal-combustion engines by 2030, and reaffirms the end of diesel by 2024.
3 August 2018	Installations classified for the protection of the environment (ICPE): signature of the ministerial order with general specifications applicable to electric bus recharging stations.
End 2019	The first deliveries of electric busses at depots converted to electricity.
End fin 2020	The delivery of electric busses following a massive order for up to a thousand busses.
2025	The RATP's bus fleet will be 100% electric, natural gas or hybrid.

A radical technological shift in transportation services

The first rupture was, of course, to replace diesel or hybrid with electric (battery) busses. Hereafter, the phrase “electric bus” refers to a bus running on electricity from a battery, its horsepower coming 100% from the energy stored in the battery.

When the program was announced, 80 out of the RATP’s 4500 busses were running on natural gas and 14 on electricity (respectively 2% and less than 0.5%). In 2013, 0.22% of busses in Europe were electric.⁽⁴⁾ The Euro VI standard, which had just come into effect for trucks, required considerable investments from truck-builders, investments that would be amortized through the sales of vehicles with internal combustion engines. Outside China, electric-battery busses were mostly niche markets, such as urban shuttle services made up of vans or small busses (6-9.50 meters long). The shift from busses of a standard size (12 meters) to electric busses seemed far away. For public authorities (the regions and cities that organize public transit), operators and bus-makers, the reference point was diesel or eventually hybrid busses.

The switch from a diesel to an electric motor meant radically redesigning the bus as a product, since more than two tonnes of batteries had to be installed in a traditional bus, which, empty, weighs nearly twelve tonnes. Unlike private cars, where installation of the battery in the lower part of the chassis lowers the vehicle’s center of gravity, a modern bus must have a low floor for facilitating passenger access. As a consequence, the batteries can only be installed in the back or on the roof. In other words, the bus’s architecture has to be redesigned at the same time as its motor.

⁽⁴⁾ Page 17, 3ibs (<https://cordis.europa.eu/project/id/314334/reporting>) D 23.1. These statistics do not take account of trolleys, which represented 1.2% of the European fleet. A trolley mainly relies on electric current from the cables suspended above the line.

A systemic disruption but without interrupting services

Like the shift to electric automobiles, which does not mean just replacing thermal with electric motors, the development of fully electric public transit services deeply alters all variables in the transportation system: busses, of course, but also the energy infrastructure, activities at maintenance depots, and processes for operating transit services (cf. Figure 2). The components in this system and their articulation have been stable for decades, owing to the dominant design model for busses with internal combustion engines (ABERNATHY & UTTERBACK 1975 & 1978). The shift to electricity means changing components and their articulation in the overall system.

Redesigning the energy infrastructure

Battery-charging stations has been recognized as the Achilles’ heel of electric mobility. This holds for the Bus 2025 Program. Will the electricity grid be capable of charging the batteries of more than 3000 electric busses? When the program was launched, the answer was not evident. With approximately 200 busses per depot, each depot would have to receive about 10 MW of current — the average drawn per month in the winter by 10,000 households in France. Besides this question of capacity, connecting 17 electric bus depots to the grid is a major industrial project, necessitating approximately 100 km of trenches on public streets and highways.

Redesigning depots

A bus depot is a parking lot with white lines, a gasoline station and a building for maintenance work. Under the program, the depot has to be turned into an industrial center for charging batteries, a task that takes several hours. This means installing parking places with high-voltage stations and designing systems for distributing and transforming the electricity so that the batteries can be recharged in time. Recharging the batteries of 200 busses simultaneously with 10 MW in a space that, in the dense Parisian area, amounts to 500-700 apartments is not just a technical but also

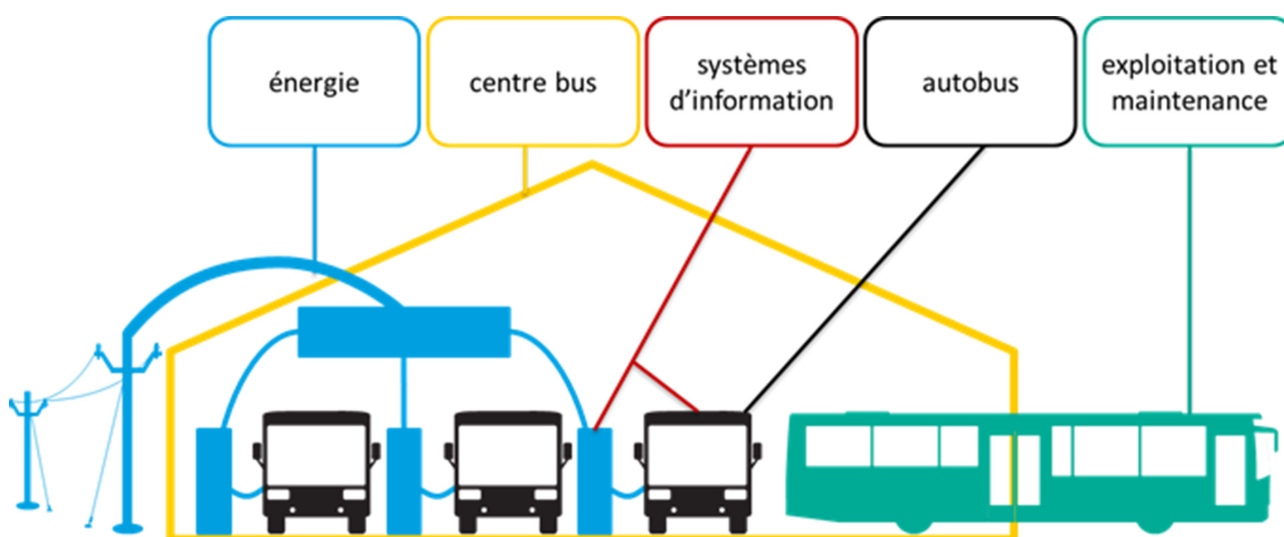


Figure 2: The principal finds of activity of an electric bus transportation system

a regulatory challenge. Regulations about installations “classified for the protection of the environment” (ICPE) did not foresee this case. They contain a section on small batteries (for elevators, for example) with rules that have to be followed when the current loaded is more than 50 kW. The consumption of electricity by a bus depot overshoots this ceiling 200 times. Following the regulations also implies major (but classical) construction works, such as the installation of sprinklers or protective barriers — on locations where installations often date back to the start of the 20th century. For instance, to store water for the sprinkling system, vats have to hold hundreds of cubic meters; and holes have to be dug for storage pools — a herculean task in a bus depot that remains in operation.

Redesigning current operations

The shift to electric vehicles brings along new conditions that have to be managed. Whereas the bus’s autonomy is not a problem when it has a diesel engine, it has now become a parameter — the battery range or capacity — that has to be controlled. Reloading a bus’s tank with diesel fuel took only a few minutes during the night, while the recharging of batteries has to be optimized in the organization of work at the bus depot. This restrictive factor could be loosened by increasing the number of busses in operation, but the program’s objective is to have the RATP’s bus fleet undergo the energy transition as is. The RATP thus started conducting in-depth studies of its current operations in 2016.

Till then, timetables for drivers as a function of bus services and under the conditions set in the contract with public authorities had been optimized for the number of drivers, the number of busses and drivers’ working conditions. Could current operations be adapted? For example, can an electric bus driven all day long also be driven overnight? Till now, a diesel bus, if it had to be used right away, could be reloaded with fuel in three minutes. How to manage with an electric bus? How to be sure there will be enough time for maintenance, given that the bus cannot be recharging its battery during certain maintenance operations? How to be sure that the battery has been recharged adequately so that the bus, once back in service, can function (even if the current might have been cut awhile at the recharging station)? How to design bus services and assign busses so as to cope with contingencies during daily operations? These are questions that obviously have to be answered before launching the new electric bus transit system.

Overhauling the information system

For this transit system to operate, existing information systems have to be adapted to supervise the whole chain of operations: charging stations, battery ranges, the actual recharging of batteries.... Till now, the need for real-time information from a bus in service was limited to its geolocation, so that waiting times could be displayed. With the coming of the electric bus, the vehicle’s autonomy has to be supervised in real time; and the bus has to relay technical information back to the command center. This real-time information has to be available all the time in the right format. These centralized data will have to be proces-

sed, also in real time, so as to have timely information about problems. These “real-time” requirements mean an organization capable of seeing to the operation of the whole information chain 24 hours a day. Furthermore, these data have to be stored for an *ex post* analysis, whence the need for storage space and, above all, the right analytical tools.

These important changes must be managed without jeopardizing existing infrastructures, roads, streets and bus services. This is the reason for ambidexterity: the program must be managed without interrupting existing operations and services.

Ambidextrous program management: Challenges and principles

How to manage systemic disruptions? We shall use the Bus 2025 Program to illustrate the principles that guide the organization of ambidextrous program management (MIDLER *et al.* 2019), namely:

- strategic flexibility;
- in-house learning processes related to a portfolio of heterogeneous projects with different time horizons;
- management of the ecosystem (partners, stakeholders, etc.) so that the transition will be a success;
- set up a governing structure to steer and coordinate the project; make choices for ensuring the ambidexterity of the transition, *i.e.*, invent and deploy the new transit service without jeopardizing current operations and services.

Strategic flexibility

In traditional project management, a project might be an element in a precise strategy. For instance, the classical projects portfolio management (PPM) basically organizes priorities among projects as a function of their alignment with the firm’s strategy (assuming that it is stable).

In the management of the transitions described herein, there is a global vision, but the precise means and phases cannot be defined at the outset. An ambidextrous program is conducted in an ambiguous strategic context and must, therefore, be as flexible as necessary so as to make adjustments as projects advance. In the electric bus program, the initial goal of 100% electric by 2025 was, in 2014, trimmed down to a mix of 80% electric and 20% natural gas and then, at the end of 2017, on the basis of the findings of the studies conducted, again revised down to two thirds electric and one third natural gas.

This readjustment of the initial objectives has two consequences, as in all megaprojects (BEN MAHMOUD-JOUINI 2019). First of all, it proves that a “moment of truth” must be foreseen as soon as possible in order to adjust initial goals to precise, realistic objectives. Secondly, it means mastering communications with stakeholders and the general public so that these adjustments do not appear to be renouncements but, instead, normal actions in an emerging strategy (MINTZBERG & WATERS 1985), as it is honed thanks to the program.

Besides the problem of the size of the electric bus fleet, and given the program's systemic nature, the major options related to the architecture of mobility services — options that will determine subsequent developments — had to be frozen during this phase. One fundamental option was the decision to recharge batteries overnight in bus depots. Several other options existed, in particular, batteries could be recharged at the terminals of the bus line or at bus stops between terminals. For several reasons, the RATP decided on the depots. It wanted to preserve flexibility, a specific characteristic of the bus as a mode of transportation. A bus can flexibly alter its itinerary in case of street works; and a new bus line can be opened within a few weeks (compared with several years for railways). Furthermore, given a bus's relatively low daily mileage, busses can be acquired that have sufficient battery ranges. Furthermore, given the restrictions in a dense urban environment (with many historical monuments), it is often hard, even impossible, to set up recharging stations at terminals. Recharging batteries along the line or at the terminal would require parking time and simple access to the charging station — two conditions not always met in the greater Paris area. Finally, the batteries can be recharged at night with a current that produces fewer CO₂ emissions, while the electricity grid is more available.

Learning to conduct multiple, diverse projects with different prospects

How has the principle of coordinating heterogeneous projects with different time horizons been applied in the Bus 2025 Program?

Simulations of the feasibility of global options

The use of primarily qualitative methodologies of creativity (as in innovation labs) is of little worth for handling questions related to the large-scale operation of a complex system, such as running hundreds of vehicles in the greater Paris area. For this reason, the Bus 2025 Program launched, from the start, a series of actions for exploring the major obstacles to scaling its projects up.

Starting in early 2016, the RATP carried out simulations for recharging bus batteries. These simulations, which took account of the time busses run and of the time needed to recharge batteries, could be used to explore the variation of parameters, such as the power per bus needed for recharging. The results have been shared with Enedis (which distributes electricity) and RTE (which oversees the high-voltage grid in France) so that they can make medium-term plans for their grids.

Other simulations have focused on the operation of bus lines, or routes. A study, which will take several years, focuses on how to manage and recharge busses at the depot. It will gradually delve into all questions about the time an electric bus spends at the depot. The initial aim was to see whether sufficient time had been foreseen for recharging batteries. In-house teams will study how to optimize the assignment of busses to services so as to maximize the recharging period for each bus. In a partnership with a public research laboratory, this research will then shift to building a

complete model of a bus depot. Studies of this sort are complicated, since they have to take account of the planned services at a depot, the time for recharging batteries there and other factors (such as parking space). They represent a completely new learning experience for the RATP that will help it develop an operational information system.

Experiments for a collective learning of new operations

At the end of 2015, the RATP also launched studies on the infrastructure in view of a first series of experiments on a line for an electric bus of standard size (12 meters). The 23 diesel busses on Line 341 will be converted to 23 electric busses to be recharged at the Belliard depot in le 18th arrondissement of Paris. This experiment sought to learn about several aspects of the transit system, in particular the distribution of current at the depot.

To benefit from the feedback from these studies, a second experiment was conducted at the end of 2016. It mainly sought to study the recharging of batteries at bus line terminals, but it will also test the systems of distribution foreseen for general use. It will help foresee the forms of organization needed for this generalization. In effect, the conversion of 17 bus depots in seven years time calls for major efforts. Since transit services have to continue throughout this period, any construction work will be carried out while the depots remain in operation. Besides construction equipment, approximately 200 busses will be entering and leaving each depot every day, all this in an extremely dense urban environment. Several teams have been formed to oversee the construction work on buildings and electric lines; and one team is to coordinate all players and current operations.

The first wave of experiments focused on converting Line 341 to electricity. Nearly all fields of engineering were involved: electricity, information systems, the building trades, operations and maintenance. The public administration paid close attention to this experimentation since it was, at the time, drafting regulations. Busses on loan were used in tests. These experiments have accelerated learning at the participating firms and in the RATP's engineering and current operation departments. Studies of several subsystems have been made to clearly specify the transit operator's needs and improve its understanding of electric bus systems.

A second phase of experiments tested the solutions worked out during the previous phase: electric heating in busses, their electric architecture, the organization of construction work at the depots, and the recharging of batteries at terminals as well as the supervision of this operation. These studies are increasingly systemic in view of building a model of all aspects of the operation of electric busses.

For the rollout phase, the RATP has chosen to gradually scale up skills and qualifications. Following a decision-making process involving major actors in the firm, a multicriteria analysis will rank the depots so as to give priority to those where it will be easiest to

convert bus lines to electricity. This analysis will also take account of the construction work necessary for this conversion. Two new depots, partly predisposed for this, are going to be converted in advance. They will use busses (acquired under an intermediate bid) nearly a year before the rollout at the other depots. This rollout will take place gradually, thus bridging the transition between the phases of experimentation on location and massive deployment.

By the end of the second phase of experiments in 2018, the RATP was running 80 electric busses, half of them of standard size. By the end of the first subphase in the rollout (late 2019 and early 2020), nearly 160 electric busses will be in circulation. The rollout will intensify, with deliveries of up to 600 busses per year, an unprecedented pace for the firm.

Thanks to this engineering model for an ambidextrous rollout, all actors in the firm, in particular those who continue their usual activities, can be involved. While the program is under way, operations with diesel busses continue. The RATP will purchase its last hybrid bus and inaugurate two new depots. The experiments and thematic committees are forums of exchanges where those involved in the program regularly meet personnel from traditional occupations, exploration and current operations.

Managing the ecosystem

Although we have insisted on actions inside the firm, the systemic nature of the transformation requires implicating in the engineering model of the rollout all stakeholders outside the firm: bus manufacturers of course, the transit authority (IDFM) and operator (RATP), and the public entities (Enedis) in charge of regulating and distributing electricity.

The design and supply of electric busses

In 2014, European automakers had very little experience with electric busses. A few urban shuttle busses or vans (6-9.5 meters long) made up most of the electric fleet in Europe; the penetration rate was only 0.22%, while standard size busses (12 meters long) represented approximately 56% of the European and 85% of the RATP's fleet.⁴ Only a few prototypes of electric busses produced in small series were in circulation. To test and stimulate the market, the RATP issued a first, experimental, invitation to bid in 2014. Its specifications stipulated a minimum autonomy of 120 km between recharges. Given the ceiling set at €20 million, this represented a small procurement operation for the RATP but an important market for electric busses. Bluebus, a subsidiary of the Bolloré Group, won the contract while pledging an autonomy of 180 km. Unlike some established vehicle-makers, this newcomer would make the busses from scratch so as to better take account of specifications for the batteries.

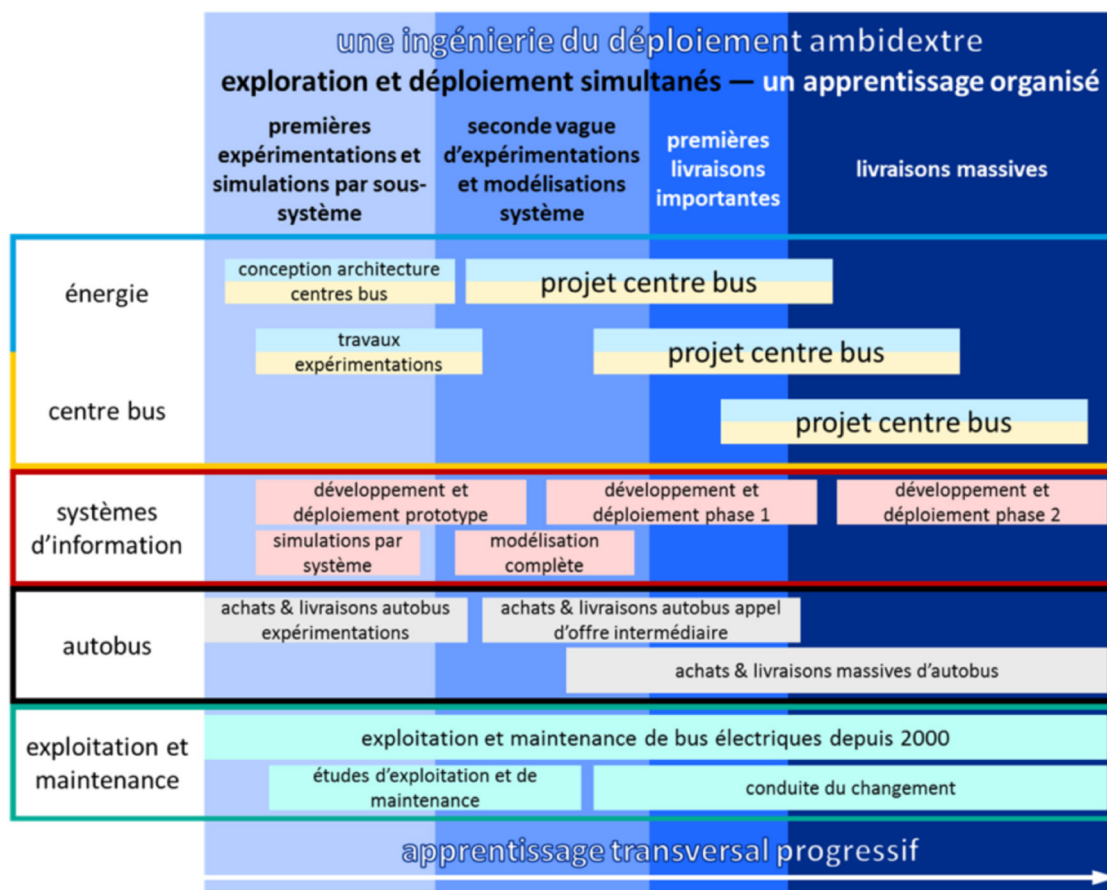


Figure 3: The engineering of an ambidextrous rollout of electric busses

Shortly afterwards, the RATP proposed to automakers worldwide to test electric busses, often with passengers, under operating conditions. Seven manufacturers from four countries (France, Spain, China and Poland) loaned vehicles for use on bus lines in Paris. These busses were equipped with devices for measurements. Tests started at the end of 2015 and lasted several months. All participants thus improved their technical knowledge of these vehicles and of the infrastructure, and better understood the operation of electric busses. These experiments created knowledge for engineering, for operators and for the companies that supplied the vehicles. Surveys at that time confirmed the validity of the switch to electric busses in Paris: most passengers preferred them, and drivers very much appreciated the calm, fluid driving.

As a signal of its determination, the RATP launched other invitations to tender for electric busses: an intermediate one in early 2017 for a total of €40 million, and a massive one in early 2018 for a maximum of €400 million with the goal of up to 1000 busses — the largest public procurement of electric busses in Europe.

Purchasing such large quantities of vehicles meant drafting lists of specifications. For this, the RATP's engineering department had to take account of all requirements, in particular, for the electric drivetrain. Successive invitations to tender and the experiments with loaned busses were crucial to the program. The experience gained by those involved and the exchanges upstream with manufacturers were essential for formulating with manufacturers realistic but ambitious demands. Let us take the example of heating, a critical point in an electric bus. Heating a bus used to be a nearly for-free operation, since the diesel motor produced heat that could be recuperated inside the bus. These exchanges with manufacturers would lead them to guarantee an acceptable temperature for both driver and passengers, while seeing to it that the bus could be driven the distance planned. New servomechanisms had to be designed specifically for these busses.

Given these massive invitations to bid, activities had to be reorganized in view of the volume of procurement. The teams that accept deliveries normally check whether the goods comply with specifications. They are used to handling about 300 busses per year (exceptionally up to 500). To be sure that it will be able to do without diesel busses by 2025, the RATP will have to take delivery of 600 (electric or gas-fueled) busses annually over a period of several years. The challenge is twofold: take delivery of an unprecedented number of new vehicles and see to the operation of the busses using a new technology and the interfaces with this new ecosystem.

Involving public authorities

Public transit naturally involves many public actors. A transformation like the Bus 2025 Program can be undertaken only in close cooperation with a large number of public authorities. Let us now discuss two of the roles played by these authorities in the program: the role of setting (and sticking to) a schedule for the energy transition and the role of regulatory guidance.

- **SETTING A CALENDAR FOR THE ENERGY TRANSITION.** Public authorities see to it that the timetable set for the Bus 2025 Program is kept. The history of this program is about ongoing interactions between the conditions imposed by authorities at various levels and the RATP's strategic decisions (*cf.* Table 1).

The first level of public authorities involved is regional, namely Île-de-France. The transit authority's decision to halt the procurement of diesel busses led the RATP to make the strategic decision to convert its fleet to electricity and natural gas.

At the state level, the TECV Act on the energy transition for green growth ratified, we might say, this strategic decision. Under its provisions, cities with more than 250,000 inhabitants are to acquire by 2020 at least 50% of busses with lower emissions and by 2025 100%.⁽⁵⁾ It was probably easier to add these provisions since the RATP had already announced its decision to convert its fleet at a faster pace. This act has facilitated the rollout of electric bus programs. When a program is made mandatory under the law, it becomes less uncertain; and its implementation, more evident for actors, both internal and external. Thanks to this act, the Bus 2025 Program is no longer an isolated pilot experiment. The RATP is leading a large group of metropolitan areas that will be converting to electricity.

The state has also given cities a means for implementing the TECV Act: it allows local authorities to set up low-emission zones (ZFE). The city of Paris has taken advantage of this provision to keep the most polluting vehicles, including mass transportation vehicles, from entering the city. It has also announced its intention to gradually shorten the list of vehicles allowed to enter the city, the objective being to eliminate all diesel vehicles. Mayors in the neighboring communes belonging to the Greater Paris Metropolitan Area are planning similar restrictions. Although these announcements and decisions do not have an impact on the strategy for the Bus 2025 Program, which, as pointed out, has set very ambitious objectives, they do make it more legitimate. This most ambitious electric bus program in Europe now replies to a demand from local authorities. For this reason, not sticking to the schedule is out of question. Besides, those who head the program have had to contact stakeholders and explain to them that accelerating the implementation of such an ambitious program cannot be imagined.

- **REGULATORY GUIDANCE.** Interactions with public authorities have been ongoing for the purpose of adapting the rules and regulations for public transit.

A positive point for the development of electric busses was Article R312-4 in the French Highway Code, which authorizes such vehicles to weigh a tonne more than the normal limit. An electric bus may legally weigh up to 20 tonnes with its passengers, compared with 19 tonnes for a diesel bus. Thanks to this, electric busses can be built and purchased that transport the same number of passengers as a diesel bus. In other

⁽⁵⁾ Article L224-8 of the Environmental Code, created by Article 37 of the TECV Act on the energy transition for green growth. Act n°2015-992 of 17 August 2015 available at: <https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000031044385>.

countries, the 19-tonne limit has hampered the development of busses with electric batteries, since operators claim, rightly so, that they want to transport people instead of batteries.

Owing to its innovativeness, the Bus 2025 Program has made it necessary to rethink existing rules and regulations. For example, regulations about the workshops for recharging batteries were made for lead batteries, which can emit hydrogen if damaged. This is not the case for the modern lithium batteries installed in electric busses.

The public administration may decide to set up an “authorization-based” system when it is unable to draft general rules for a new field of technology. Operators will then have to show, case by case, that their installations are safe enough for property and people, in particular employees, neighbors and other third parties (such as firefighters). This procedure would add at least twelve months to the period for converting a depot (the time needed to conduct a mandatory public survey). Furthermore, it would raise costs significantly since models would have to be built for each depot. Foreseeing this risk, the RATP entered into contact with the administration in 2015 for the experiments at the Belliard depot. For approximately three years, the RATP and its partners have built models of how busses and batteries are used, and have carried out tests in certified centers to better understand how an electric bus can break down. This work led the administration to draft a set of regulations about electric bus depots. Enforced since August 2018, it has many more regulations than those for diesel busses. Nonetheless, thanks to it, the RATP can plan the rollout phase of its program on a stable basis without going through an authorization process.

Involving energy-providers

As of 2015, the RATP had contacts with the distributor of electricity, Enedis (ERDF at the time), to improve connections to the grid in bus depots and ascertain whether the grid had the capacity for recharging bus batteries. Owing to transit by rail (the Parisian and suburban subway systems, tramways), RATP’s engineering department has a long experience with electricity and already had close ties with Enedis. Having its own system for distributing electricity in house, the RATP was already aware of the constraints and delays for public works on such a system. During the discussions planned with the energy-provider, the RATP asked for several scenarios of connections to be examined and for feasibility studies for each depot. The results are conclusive: the electricity grid in Île-de-France region has the capacity for recharging the RATP’s electric vehicles. To provide for the continuity of public transit services, the RATP has opted for a double connection to the Enedis grid, since, in case of a single connection, a severed cable would halt operations at the depot for several days.

The first series of studies launched at the start of 2016 focused on the overall design of the electricity grid in bus depots. Several options were worked out; and each was then analyzed using the criteria of labor costs, geographical impact (in a dense urban environment

with scarce space for busses), feasibility and maintainability. The solution selected will maximize the space for busses, and guarantee a high level of feasibility at a controlled cost.

Connecting 17 electric bus depots is, as pointed out, a major industrial challenge that entails digging approximately 100 km of trenches on streets and highways. To oversee these works and best optimize public expenditures by sharing the costs of handling mutual constraints, the presidents of the RATP and Enedis signed a partnership in early 2018.

A program team for orchestrating contextual ambidexterity

The Bus 2025 Program is a portfolio full of projects that have different purposes and involve different actors. Some projects explore possible scenarios; others will work out solutions for 2025; and still others, examine transitional procedures for passing from the current situation to future services of mobility. How to organize this transition without jeopardizing current operations? This is a key topic in research studies on organizational ambidexterity. The literature has pointed to three possible forms of organization.

STRUCTURAL AMBIDEXTERITY consists of separating the persons in charge of designing the solutions for handling a disruption (TUSHMAN & O’REILLY 1997), as in the case, for example, of the management of projects like Renault’s Logan or Kid (JULLIEN et al. 2012, MIDLER et al. 2017). In contrast, CONTEXTUAL AMBIDEXTERITY is based on managing a transition while letting the firm’s actors in their usual situation at the workplace but giving them the time to explore scenarios for the transition (GIBSON & BIRKINSHAW 2004). NETWORK AMBIDEXTERITY relies on actors outside the organization to make the rupture, actors (typically startups) who will be helped in their exploratory activities (by funding them or welcoming them in a firm’s business incubator). Forms have emerged that combine these three models in innovation labs, which ever more big firms are setting up (BEN MAHMOUD JOUINI 2015).

The organizational options chosen by the RATP to articulate the Bus 2025 Program with the existing organization follows a model of contextual ambidexterity. These options give priority as much as possible to intimately associating the actors of the transformation with the system of operations in place.

- ORGANIZING THE PROGRAM hinges on the position of the “program team”. In mid-2015, a division was created for the program within the rolling stock department (MRB) in charge of the purchase and maintenance of busses. This choice might come as a surprise in a firm where another department is devoted to major civil engineering projects; but it turned out to be judicious in many ways throughout the program.

To its advantage, the MRB is closer to current operations and maintenance, and under the deputy CEO in charge of transportation and maintenance. The purchase of busses, which represents the largest heading in the program’s budget, is in his hands. This proximity with

the program seems essential for mastering the new interfaces, while the proximity with current operations facilitates the leadership necessary for accompanying the move toward electric busses. However the MRB is oriented toward processes but has had little experience with projects. It has had to adapt to project management.

For these projects, several levels of steering have been introduced. A steering committee meets every two months and reviews all projects in the portfolio. Alternating with these meetings are those of several select committees, which follow up on the projects in more detail. Finally, each project in the portfolio is subject to a semestrial review and assessment. At all these levels, the program director is present.

In all, the implementation of the electric bus program directly involves more than 150 people in the firm, without mentioning the more than 15,000 operatives, drivers and maintenance workers employed by the RATP or the persons concerned among subcontractors and suppliers.

- **GOVERNANCE.** To involve as best possible all departments in the RATP and foresee the changes that will affect numerous persons in engineering, operations and maintenance, a governing structure was set up at the company level in early 2016.

Every three or four months, Comex, the executive committee (including the RATP's president), meets for about two hours to foresee and address major risks. In addition, regular steering committee meetings are held with the transit authority, IDFM, on various aspects of the program.

A form of governance has been set up in parallel by occupational field. Thematic committees meet every quarter or semester to discuss the program's main aspects: bus depots, current operations, maintenance, energy, etc. The results of the studies being conducted are diffused during these committee meetings. The major decisions made are recorded in the presence of the program director and the heads of occupational fields.

- **LEARNING ACROSS THE BOARD.** To respond to the challenge of conducting simultaneously the phases of exploration and rollout in both familiar and unknown fields, the RATP has set up two forums for pooling skills and capitalizing on the qualifications that gradually develop during the program.

The one is related to the full-scale experiments that involve nearly all occupational groups. The other forum is the thematic committees that, besides their role in governance, are also places for exchanges among experts (in particular about the studies to be carried out).

A model of ambidextrous program management

Systemic disruptions, like those described herein, are occurring in several sectors: sudden, radical, massive transitions that, with a perimeter much larger than the core business, concern diverse parties other than a firm's usual partners. These transitions have to be undertaken without jeopardizing the activities that currently bring in income. Behind these inevitable transitions, we often come upon factors related to: the urgency of climate-related issues, the upsurge in power of digital technology or the arrival of competitors who, like some American or Chinese firms, are to be dreaded because of their capacity for deploying innovations. Transitions of this sort call for organizations and innovation processes different from those that made firms excel in the 1990s, when innovations were managed via a rather stable approach, dominant design.

Herein the phrase "ambidextrous program management" refers to the key principles of a new model that seems better adapted to systemic disruptions. We have illustrated these principles in the case of the RATP's Bus 2025 Program, which, still under way, is coping with this sort of disruption. Since it has not yet entered history, we do not intend to prove that it will turn into a success story. Instead, we have sought to show that certain principles of organization can be rationally more coherent with the situation resulting from a systemic disruption than the processes currently used for innovations in firms. Let us now place this case in a general model of ambidextrous program management. On the basis of the Bus 2025 Program, Table 2 summarizes the reasons that ambidextrous program management can represent a relevant response to a systemic disruption.

Contextual or structural ambidexterity?

Obviously, the case of the RATP does not let us describe all forms of ambidextrous program management. The literature on ambidexterity proposes, as we have seen, contrasting forms, between contextual and structural ambidexterity, for implementing this sort of management in organizations.

The choice offer contextual ambidexterity might be made for two main reasons.

The first has to do with the program's position in the firm's strategy. As we have seen, this transition is both a proactive strategy by senior executives and a response to external factors. For sure, the energy transition will affect the whole system of bus transportation. As a consequence, the best strategy for accelerating the transition is to involve all actors as soon as

Table 2:	
<i>Characteristics of systemic disruptions</i>	<i>Characteristics of ambidextrous program management</i>
Radical nature of the disruption	<ul style="list-style-type: none"> — Identify the target for a global strategic transition. — Adjust the strategy while the program is under way as a function of the findings of the studies conducted.
Systemic dimension of the transition	<ul style="list-style-type: none"> — Regardless of the sort, perimeter or horizon of the projects, bring them all into a single program for managing the transition. — Implicate outside actors (public authorities, energy-providers, bus manufacturers, etc.) as soon as possible in carrying out the program.
The scale of the disruption	<ul style="list-style-type: none"> — Define phases of the program while gradually enlarging the perimeter of experiments in the field.
Speed of the transition	<ul style="list-style-type: none"> — Organize a program coordination for pooling learning experiences and accelerating the circulation of their results as widely as possible and for seeing to concurrent advances in the development of all components of the global system so that certain variables not become bottlenecks that slow down the program's efficient rollout.
Pursuit of current operations during the rollout	<ul style="list-style-type: none"> — Embed the program in current operations in order to anticipate problems and prepare actors for scaling up to the global level. — Rollout options ensuring the continuity of services (hybrid busses, the priority of sites for the rollout, etc.).

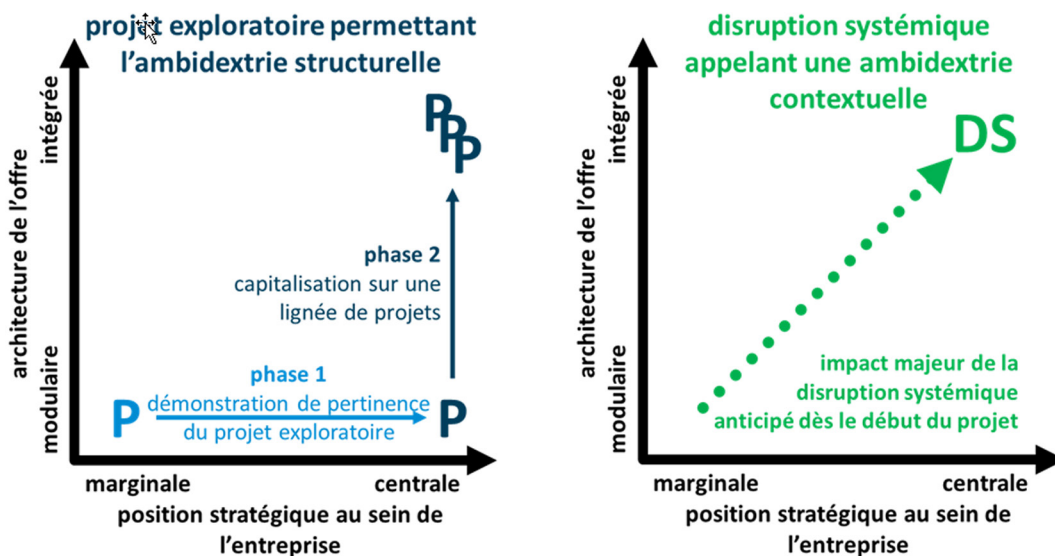


Figure 4: The organizational position of exploratory projects and systemic disruptions

possible. This situation differs from that of automakers (VON PECHMANN et al. 2015, MIDLER 2013), who have to fine-tune control over the speed of the transition toward electric vehicles as a function of less foreseeable external constraints. The full switch from internal combustion engines to electric motors in a short time would be, for global automakers, a senseless risk, since they are unable to anticipate the response of consumers and demands from regulators.

The second reason is related to the architecture of the firm's offer. Structural ambidexterity is based on the capacity to isolate the project from the firm's current operations. Electric busses have a major impact on several systems and processes in public transit companies. Beyond a few limited experiments, electric

busses cannot, as shown, be introduced in the offer of services without redesigning the system. Running both electric and thermal busses might create operational conditions that the firm would like to minimize by speeding up the transition. The situation is often different in manufacturing firms, which can devote means of production to specific products and differentiate its sales policy by type of customer or market segment. In other words, the offer of public transit services is integrated whereas the offer of products is more modular (BALDWIN & CLARK 1997, VOSS & HSUAN 2009). Managing a transition in a modular context can be done using a model of structural ambidexterity, whereas an integrated offer favors contextual ambidexterity. Figure 4 depicts these two different configurations.

The choice of contextual ambidexterity has some disadvantages, as pointed out in the literature (GIBSON & BIRKINSHAW 2004): actors might not be available because they are busy with current operations; risk aversion might be strong if changes are made too suddenly; the qualifications might be wanting that are needed to design scenarios different from what already exists. To avoid these risks while benefiting from the advantages of contextual ambidexterity, a strong program function has been introduced for orchestrating the activities of the personnel who take part in the transition, without taking them out of their operational units. This choice is the opposite of the one made by certain automakers (e.g., Daimler) in relation to the development of “autonomous” taxis (MIDLER *et al.* 2019). In this typical example of a systemic disruption, a separate, autonomous business unit is created to bring together hundreds or even thousands of persons representing the various sorts of expertise necessary for the transition; and various partners, technical firms or services of mobility are mustered around this unit so as to cover the full perimeter of providing services of mobility by autonomous taxi. This sort of ambidexterity is structural or mixed (BEN MAHMOUD JOUINI *et al.* 2007).

We cannot yet judge whether these choices are well-founded, since the transitions are still under way. We can, however, remark that these contrasting choices are coherent with the position of the actors behind the steering wheel. For the RATP, the transportation operator, the program has been centered on the integrity of the public transit system. The bus is a vehicle for providing a service, whence a management of the transition that closely associates product design with the offer of services. Automakers, on the other hand, see their autonomous vehicles as a new class of products, complementary to current product lines. These vehicles can thus be developed like a new product. For automakers, the operators of autonomous taxi systems are a supplementary layer, like the managers of vehicle fleets. Some automakers have incorporated in their strategy the possibility of becoming an operator in this new layer, while others seem satisfied with providing vehicles adapted to these specialized operators (like Uber or Waymo, a subsidiary of Google). In any case, their strategies, unlike the RATP's, do not have to take into account existing transportation services. They can, therefore, function in an autonomous structure and adopt a model of structural ambidexterity (the left of Figure 4).

Disrupted offers and customer services

What comes as a surprise in the transition described herein is that an actor is missing who is usually in the forefront of major transitions: the passenger/customer. Is the switch from internal combustion engines to electric motors so transparent for bus passengers that they take no notice of it? This absence is even more surprising since, at first sight, the question of whether customers will adopt electric vehicles was, and still is, a bottleneck in the massive rollout of private electric cars (VON PECHMANN *et al.* 2016). In this case,

a section on a complicated but indispensable topic had to be incorporated in the program, namely the customer's learning experience so that they will be ready to purchase electric cars when the offer is made (VON PECHMANN *et al.* 2015). Nothing of this sort applies to the RATP's Bus 2025 Program. Although this transition is a disruption for the transportation provider, it does not radically alter the customer experience. The switch to electric vehicles is probably going to be positive for passengers, owing to the much quieter environment in the bus or more fluid mobility, but this situation is not at all comparable with the learning experience that a driver used to an internal combustion engine goes through when switching to an electric motor.

It is worthwhile to dwell on this comparison. The “value” created by the Bus 2025 Program is collective: improvement in air quality air in urban areas. Ultimately, cyclists behind the bus will benefit more than the passengers inside. Since the benefits are collective, it is coherent that public entities (the transit authority) cover the costs and oversee the necessary changes. In the case of private cars on the contrary, individuals pay the costs and learn how to manage an innovation and benefit from it. For this reason, considerable work is necessary to create, through innovative business models and services, an individual experience of electric mobility that will stimulate purchases by individuals.

Emergency management and the “golden triangle”

The Bus 2025 Program illustrates a transition with a schedule. Triggered initially, in December 2013, by the obligation to stop acquiring diesel vehicles by 2025, this timetable was at first a priority but became a deadline under the TECV Act. The economic question was no longer to choose between doing or not doing. It had to do with optimizing the rollout of this transition so as to minimize costs. The program's successive revisions (100%, then 80%, then two thirds of the fleet to be electric busses) and the massive invitation to tender (€400 million for 1000 electric busses) were significant decisions that showed that costs were a factor to be taken into account. The “golden triangle” of quality, costs and production time has to be optimized. The balance between the economics of this program and of the agenda might have been different had the possibility of a slower transition been explored.

Conclusion

We would like to end by raising questions about the opportunities related to these ways of managing a transition. Changing society through a continuous series of incremental stages definitely seems more reasonable than triggering a sudden, global transformation. But is this always possible? Why did the RATP speed up a massive energy transition rather than opt for a smoother transition? Why did plans for electric cars stall for thirty years until a few CEOs, more ambitious than the others, set a foot on the accelerator pedal? Why wait for the Olympic Games in Paris

or another big event to start the Grand Paris Express program? The complexity of the latter can be criticized, but we waited decades in vain for it. The tempting answer is, of course, to point to the degree of maturity of the technology to be used and the growth of awareness. This argument is fallacious however. Scientific progress in electrochemistry was not the main factor that made electric mobility take off in 2011. The trigger was, instead, the ambitious industrial programs that attracted the interest of scientists from several disciplines to research in a field that had not previously caused much excitement.

Tartakover, a chess grandmaster, defined the main difference between strategy and tactics as follows: tactics is knowing, what to do when something is to be done whereas strategy is knowing what to do when there is nothing to do. The contemporary world invites us to modestly take stock of our collective capacity for strategy-making. This remark is in line with the conclusions of the studies made since the early 1990s on the concept of emergency management (RIVELINE 1991). In these studies, the sense of an emergency paradoxically emerges as an “organizational binding force” (MOISDON 1990) that forces us to transcend contradictions and find compromises between the different value systems and issues that coexist without direct confrontation during the usual operations of an organization. Rather than regretting a definite lack of foresight and preparedness for the transitions to come, the priority should be, in our opinion, to develop our tactical capacities for steering emergences in big programs with complex disruptions. This article is intended to help us learn and improve these capacities.

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