# News automation and the new actors of journalistic processes

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tion of content has undergone continuous development in the journalistic context since the beginning of this decade. This is explained by the combination of two variables: that of techno-constantly evolving information and communication logies, which are the driving force behind innovation (Hammond, 2017); and that of making available larger volumes of data that participate in the *"Datafication"*

of society (Loosen, 2018). It can also be understood as a continuation of the automation of information production methods, a corollary of the introduction of information technology in editorial staff (Linden, 2017), or as having an affiliation with a data-driven approach in journalism (Latar, 2018, p.29). The particularity of these information systems is that they are fed by data to produce texts in natural language, computer graphics or any other form of visual representation. The quality of the data supplied as input will depend on that of the outputs generated (Linden & al., 2019). The need for structured data that meets qualitative requirements, both technically and journalistically (Dierickx, 2017),

sport, economy, election results or the environment.

For press companies, the use of these technologies has several advantages: speed of execution, real-time coverage, large-scale production of content, possibility of generating different forms of visual representations from the same dataset, multilingualism and extension of their areas of media coverage (Graefe, 2016, Leppänen al., 2017). More rarely, automation technologies can aim to support journalists in their daily routines or in the context of surveys that are part of the continuity of a logic of data journalism, by providing them with an automated draft. that they will enrich with their experience (Latar, 2015).

In reaction to this phenomenon, journalists have been able to adopt a series of antagonistic postures, which bear witness to this long history of ambiguous relations that they have with computer technologies (Deuze, 2008, Powers, 2012): deterministic or resilient, considering that technological developments are inevitable and help to create the conditions for specific work or to strengthen existing professional standards (Van Dalen, 2012); reactionary, believing that technological developments represent a threat because they do not accord with professional practices and values, or that they constitute a threat to the employment of journalists (Thurman & al., 2017); positivist,

Although their processes are based on the automatic execution of algorithms, these technologies should not be considered as black boxes which would limit themselves to transforming inputs into outputs: no technology can be reduced to the computer code it contains ( McCarthy & Wright, 2004). Beyond their apparent autonomy, they result from a social construct (Bijker, Hugues & Pinch, 1987, Flichy, 1995), and they have their own materiality (Berry, 2011, Manovich, 2013, Cox & McLean, 2013 ). Therefore, the development of computer software can be examined from the angle of a cultural practice (Geiger, 2014) which " *transports social space in software networks* (MacKenzie, 2006). This approach characteristic of software studies ( *software studies)* echoes the material turn that began in the studies of journalism in the early 2000s, where technical and social

have been studied in terms of their reciprocal influences (Boczkowski, 2004).

The phenomenon of the automated production of information implies that new players from the technical world now take an active part in an editorial process which is partly delegated to them. This process is also social. In this article, it is examined within the framework of a project for the automation of economic and financial information carried out **within the Belgian daily newspaper.** *The Echo.* **Codenamed** "Quotebot", it is a journalism tool designed to assist journalists in their daily routines, in order to relieve them of repetitive and time-consuming tasks. The six journalists from the editorial staff of the newspaper's stock exchange information service took an active part in the design of the artefact, while its development was ensured by Syllabs, a Parisian start-up specializing in semantic technologies.

How did social agents in the world of journalism and the world of technology envision this new form of collaboration? This analysis is based on the hypothesis according to which the information system will not be used if it does not meet the cognitive dimensions (relating to the knowledge of the techniques and the training necessary to master them). and normative (relating to ethics) of the culture of journalism (Singer,

2003).

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**at AUTOMATION AND NEW ACTORS**

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Among the players involved in the development of information production automation technologies, a first figure will emerge: that of a hybrid profile, halfway between journalism and IT. It appeared in the mid-2000s, in the context of a data-driven approach in journalism (Dagiral & Parasie, 2011, Powers, 2012). Despite its popularity in scientific literature, this profile is still rare in editorial staff. In the field of the automatic generation of texts in natural language, a single experiment is currently attributed to a journalist-programmer: that of "Quakebot", an automated system of alarms on earthquakes, **developed by Ken Schwenke for the** *Los Angeles Time* s (Carlson, 2015).

In the United States, faced with the difficulty of attracting candidate journalists to IT, the

min went the other way, and some editorial staff turned to recruiting specialists with a more in-depth understanding of data and their analysis (Loosen,

2018). While not giving the impression of playing a different role from that of a traditional journalist, most of these hybrid journalists are linked to a creative and innovative professional culture (Royal, 2010). They generally come from the technical world and from "open source" communities (Parasie & Dagiral 2013), founded on a culture of transparency which is controversial in the world of journalism, since it can enter into contradiction. with the way to understand a journalistic process (Lewis & Usher, 2014, Dagiral & Parasie, 2011).

This dual professional nature is not without asking questions of an identity order, which may appear difficult to negotiate. " *We're not just engineers (…) At one point, I thought we might be journalists (…) Of all the options I've considered, "news application developer" is probably the best to capture what we do in the daytime* », Says American journalist-programmer Aaron Pilhofer [1].

For him, the risk presented by this profile is that of remaining confined to an IT department where his skills will not be exploited other than in IT development alone.[2] At the same time, the emergence of technologies in the field of artificial intelligence suggests the promises of "hybrid" human work, that is to say mixed with algorithms, to adapt to capacities and limits of these technologies (Diakopoulos, 2019, p.35).

The developers attached to the IT department of a newsroom constitute a second type of actor likely to be involved in the development of an automated information project. The automation of dispatches from the Norwegian press agency NTB, based on a variety of quantifiable data (house prices, company financial results, sports results, etc.), illustrates this possibility (Fanta, 2017). In 2016, the agency launched its first copywriting engine to extend its coverage area of sporting events to local meetings. To do this, its internal human resources worked hand in hand with a specialized digital studio.[3]

In the fields of interface and application design, collaborations between journalists and developers will participate in the emergence of a front-end press, although the latter do not identify themselves as journalists: their

activities take place in a space where technology and entrepreneurship coexist (Ananny & Crawford, 2015). While computer scientists and journalists may find it difficult to develop a common language due to different professional cultures (Lewis & Usher, 2014), their dependence seems stronger than the differences in their work cultures (Karlsen & Stavelin,

2014). Operationally, interactions between developers and journalists are often of a time-limited nature, and they do not lead to long-term formal collaborations in the development of new products (Weber & Kosterich, 2017).

In the majority of information production automation experiments that we have been able to identify [4], it appears that the actors most involved in it are technological start-ups specializing in automatic language processing (NLP). Globally, there are less than fifteen (Dörr, 2015). These companies offer their services to a variety of industries, such as communication, marketing and e-business. The news media are therefore not their only clientele. However, it is not possible to know with precision the extent of their involvement in this sector, since some media choose not to inform their readers. This non-disclosure of the nature of the author does not participate in a process of transparency and explainability (Linden & al.,

2019).

The solutions that these companies offer participate in two different logics. The first consists of relying on machine learning technologies, characteristic of current developments in artificial intelligence, as is the case of the American companies, Narative Science and Automated Insights.[5] The second is based on rule-based systems, which mimic a rudimentary form of intelligence, as is the case with the French start-up Syllabs.[6]

These companies also stand out in the way in which they ensure the provision of their services, following two other logics: that of software that the customer will configure according to the data he wishes to process, as is the case within the Swiss press group Tamedia for the automation of voting results - this activity has also been entrusted to data journalists (Platner & Orel, 2019) -; and that of an information flow to which the customer subscribes in the form of a subscription. In the latter case, the development and configuration of the

editing will be carried out by the service provider, inducing greater dependence on him. This is the way in which "Quotebot" was understood, one of the first projects to automate news production carried out within a Belgian French-speaking press group.

**Empirically tested**

The field of research is that of the drafting of *The Echo,* a Belgian daily newspaper specializing in economic and financial information published by the Mediafin group. Born at the end of the nineteenth century, it is a " *quality paper* "Which seems spared by the crisis in the small French-speaking Belgian media market, if we consider the constant growth of the paid distribution of its print and digital editions. Outside of his field of specialization, he deals with Belgian and international politics, as well as cultural news. It is also one of the only news media to have developed a multimedia center which brings together journalists with versatile profiles, a data journalist and a developer. The activities of this cluster focus on the development of innovative stories, whether in long formats or interactive applications. 7.

The "Quotebot" project was initiated in January 2018. Its development continued until June 2019. It designates a stock market information automation system. This object of journalism (Anderson & De Maeyer, 2015) was also conceived as a tool. It is intended for two distinct audiences: that of journalists, considering this information system as a tool to support their daily routines within the framework of the management of the "Market Live" section of the website, which offers full coverage. real time of the main world stock exchanges; and that of daily readers, through the strengthening of a paid service - the management of a virtual portfolio of shares - offered on a digital platform integrated into the media's website. For journalists, the expected benefit consists of taking on repetitive and time-consuming tasks. 8.

The project is overseen by the digital media manager of *The Echo,* who was piloting a project of this type for the first time. His role is part of the continuity of his professional missions, which consist of mediation activities between the editorial and technical teams. He describes himself as a " *facilitator* "Whose

mission is to create processes intended to " *facilitate the work of journalists* ". This implies remaining attentive to the needs and constraints inherent in the project, whether administrative, technical or journalistic. 9.

"Quotebot" benefits from a grant from the Google Digital News Initiative, a fund intended to support digital innovation in European media, for a total budget of 211,099 euros (70% of which is funded by Google). The French start-up Syl- labs is the service provider in charge of developing the artefact. Specializing in semantic analysis and automatic generation of natural language texts, the company was founded in 2006 by a computer engineer and a linguist. She became known in the news media in 2015, when she worked on the automatic generation of texts of the results of the first round of French regional elections for *The world*. About a million articles were then generated overnight 10.

While it also counts companies from a variety of sectors among its clients, media companies are the ones that give it the most visibility in the media ( *West France,* France Télévisions, Slate, AFP,…). Since its inception, it has experienced continuous growth. As of July 2018, its team consisted of 23 people, including interns, half of whom are linguists and the other half are computer scientists. Syllabs claims to be a technology company and not a media company, any more than it considers its editorial engine to be assimilated to journalism: " *What we are doing is not journalism. It has nothing to do with journalism. We don't do an investigation. We are doing an extremely light analysis. We don't criticize. We're just giving information. Journalism still goes far beyond* " 11.

The method of collecting empirical data falls within the framework of the first development phase of "Quotebot", which involves identifying user needs and defining editing scenarios. It is based on three axes: (1) participant observations which took place over a period of six months

- they include five meetings involving members of the editorial staff of *The Echo,* and six calls made via Skype between representatives of Syllabs and Mediafin; (2) three interviews with the digital media manager of *The Echo,* which acted as a mediator between the worlds of journalism and technology, and five interviews with representatives of Syllabs, three of which took place in the context of this study of

case; (3) a half-day of observation within the stock exchange information service. These devices have been considered in terms of complementarity. Participant observations help to provide context for the experience, as it is difficult to analyze changes and processes on the basis of interviews only (Becker & Geer, 1960). The main benefit of the researcher's on-board posture was to obtain privileged access to all the information relating to the project (Soulé, 2007), with a view to following the different stages of its socio-technical construction.

The theoretical and conceptual framework implemented in the analysis of the results is that of the SCOT model ( *Social Construction Of Technology),* which makes it possible to understand how a technological artefact is the fruit of a co-construction and of compromises, which result from particular interests among the social agents involved (Bijker, Hugues & Pinch, 1987). This analysis is also based on a sociology of uses, dealing with the conditions of production and dissemination of a technology (Massit-Folléa, 2002). From this perspective, the involvement of journalists-end users in the process of designing the technological artefact is considered a first form of use. This aims to define the functionalities of the device and guide technical choices, while taking into account its development context (Akrich, 2006). The mode of intervention of journalists, actors of socio-technical innovation, will depend on adaptation.

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I **Is Journalists, Curators of** ' **innovation**

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At Syllabs, each automation project is deployed in two **phases** [12] **a first, relating to the configuration of the drafting** engine, which aims to define drafting scenarios according to the available data; a second, devoted to the tests that the customer will perform on the proposed generations. Each project will **have its own writing engine.** [13]

The peculiarity of the "Quotebot" project consists in the active involvement of journalists-end users in the entire process of designing the artefact, ie six journalists attached to the stock market information service, out of the fifty or so journalists. writing. Since the system aims to support their routines, and in the spirit of an adequacy to their

end uses, they were asked to define the types of content they wanted to see automated. Their needs were clarified over the course of five working meetings, which took place over a period of six months: a daily report on stock market activities, at the opening and closing of the session, as well as at stake; highlighting the stocks that recorded the greatest decline or the largest increase; a daily sectoral top-flop; and a device alerting them to values behaving in an unusual way. Three types of content are therefore considered: textual (in the form of short reports) and visual (in the form of graphs or tables), with a view to facilitating the understanding of figures, a journalist stressing that " *in some cases, the visual is more important* " [14].

Journalists were also invited to express their views on how they would like to receive automated content (via email for alerts, via an internal content management system for automatic generations) . It is agreed that each of this content will be subject to validation, with the journalist deciding whether to publish it as is, or whether to enrich it with contextual elements. Audiences will be notified of the automated nature of the publication, a specific mention having been provided for their attention.

These conceptual aspects have given rise to the development of text templates which take into account, on the technical level, an implementation based on a rule-based system ("if the value is X then it is 'is an increase / decrease of X "). About twenty text models were thus worked on, while taking into account the different variations of indices or values likely to arise. For example, the opening of a stock market may show an upward or downward trend, a slight drop or a slight rise, runaway or fall. In a concern of precision and considering that journalists are experts in their field of application, journalists have defined ranges which quantify these phenomena. Due to a specific vocabulary inherent in the field,

The objective of this work was to provide Syl- labs with as many indications as possible which will enable it to respond in a manner consistent with the requests expressed by journalists, with a view to

to mobilize their end uses. The approach by " *template* »Which was privileged here concerns less the syntactic realization than the determination of the processes. It finds its meaning when the variability of the generated texts is limited (Reiter & Dale, 1997), which is the case in the context of this project where the texts are characterized by their repetitive nature and a format which does not exceed ten lines. Its other advantage lies in a better understanding of the generation process by experts in the field of application, in this case journalists (Reiter & Dale, 1997).

The journalists involved in this project were enthusiastic, immediately perceiving the usefulness of the artefact. " *We're going to make this machine work!* "" *It is an additional source of information that will make our job easier.* " [15].

" *If it can help us not to copy stock market prices (* …) *If it can help us automate some tasks to focus on something else* " [16]. At no time did they express any fear of being replaced by a machine. On the other hand, this aspect was mentioned, but on the tone of the joke, about Syllabs: " *Are they going to replace us? We help them replace us* " [17]. Representatively, the possibility that the artefact contained a part of themselves was raised, in the context of the retirement of a journalist from the service. This has led to the emergence of a possible "affective" relationship to certain textual content, or even to the artefact itself. However, the journalists did not want the name of the project to be changed, as this could have given it a more "human" character.

Their general perception of "Quotebot" is that of a tool intended to support routines falling within the condensed time of immediacy: from the opening to the closing of a stock market, indices and stocks can be aware of many variations which must be accounted for quickly. The "Market Live" section of the

*The Echo,* for which these productions are intended, is presented in the form of a blog. This one is fed, throughout the day, by short factual texts, punctuated by more complete texts which may consist of summaries or contextualizations. To ensure this coverage, journalists juggle three computers: a first to write their articles and consult their e-mails as well as agency dispatches, a second dedicated to spreadsheets from a system internal to the newspaper which delivers in real time the evolution of stock market values, and a third reserved for information from the Bloomberg press agency, specializing in economic information

mical and financial. It is an intense job, which leaves them little respite. " *This is the spreadsheet I use the most* », Explains a journalist. " *But I also use dispatches from Reuters and AFP, the social network Twitter as well as press releases, which will, for example, inform me of the exceeding of the shareholder threshold in a given company. This is the kind of information that doesn't have much value, but speaks to the sensitivity of the market* " [18].

Although characterized by quantified data, the field of application cannot be approached only through the prism of values: this is the limit of "Quotebot", of which everyone is aware. Also, the stock markets are driven by a feeling of confidence, irrational and diffuse, which cannot be quantified or deduced automatically. While a stock market phenomenon can be explained, this explanation is not always to be found in the sole economic fact. " *News can influence stock market prices (…) Currently, US policy is making markets volatile. There are a lot of uncertainties and the markets don't like it* " [19], underlines a journalist. For example, the terrorist crisis of the early 2000s in the United States led to " *psychological effects such as panic and mistrust of the banking and financial markets* "And" *negative effects especially on the air transport and tourism sectors* "(Bensafia & Gervasio, 2011). Syllabs also recognizes this limit linked to the complexity of the field of application: " *We can automatically produce texts on the tops and flops of the day on the stock market (…) Only the journalist is able to analyze the causes and consequences of these tops and flops* " [20].

Throughout the Quotebot design process, the role of the digital media manager of *Echo* is going to be that of a mediation between the social agents of the worlds of technology and journalism. With a literary background, he has acquired technical skills which allow him to practice a common language, depending on whether his interlocutor comes from one world or the other. In particular, he will coordinate the transmission of information, in turn to the editorial staff of stock market information, to the newspaper hierarchy, to external IT service providers, who will ensure the implementation of the flows provided by Syllabs in the content management system usually used by journalists, representatives of Syllabs and those of the Google Digital News Initiative, which funds the project. In this sense, its mission is that of assisting in a process of translating a scenario, here defined by the journalists, where each

technical decision will initiate a distribution of skills between the social agents involved in the socio-technical network (Akrich, 1993).

This mediation officer believes that his involvement in this project is not very different from the missions he usually performs. " *I will give journalists a method, a process to follow. When it comes to a specific project, I will bring all the stakeholders around the table. I will try to anticipate any technical problems that might arise, and also ensure that a device is usable for journalists* " [21]. In retrospect, it will say: " *As I was at the heart of the project, it was up to me to understand each of its parameters in a precise way, whether in terms of knowledge of the stock markets, in terms of issues encountered by Syllabs, or in terms of planning and resources relating to the operation of the websites of* The Echo " [22].

the collection and storage of data as well as aspects relating to the sending of automatically generated productions; and a junior linguist, working on the coding of texts to be validated by a senior linguist. Usually, an automatic text generation process begins at Syllabs with an analysis of the data " *to understand what we will receive* " [23]. A sample of texts is then written by hand by linguists, before being submitted to the client who will validate or amend it as part of an iterative process. In this project, this editorial work was taken on by the journalists-end users of "Quotebot", thus shaking up a way of doing things usual at Syllabs. However, this directive approach made the work easier, says the co-founder of Syllabs " *but what was missing, to make it perfect, as in the case where we are working on a manual sample ourselves, is the data. It's a question of knowing what we have in and what we can have in output* " [24].

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I at " rationality " TECHNOLOGY

The preparatory work for the design of "Quotebot" was the subject of regular exchanges between Syllabs and the digital media manager of *The Echo*. These communications allowed the latter to comment and clarify certain aspects relating to journalists' requests. They also made it possible to tackle more technical aspects, essentially linked to the transmission of data from Mediafin to Syllabs, with the operational aim of collecting "the right data at the right time". This data is provided in real time, in a structured format, via a programming interface (API) developed within the Mediafin group. The provider of this data is VWD Group, headquartered in Frankfurt and which develops its activities around computerized services for the investment and news media sectors.

Syllabs will also ask for several clarifications relating to the text templates provided by journalists, whether about the way to structure the story, possible lexical or syntactic variations, the characteristics of a stock market index, or again the definition of thresholds allowing, for example, to define a stagnation effect.

At Syllabs, three people were attached to the "Quotebot" project: the co-founder of the company, a linguist by training, in charge of the relationship with the Mediafin client; a project manager, ensuring the management of the relative aspects

In terms of data, the project manager does not consider that "Quotebot" has any particular specificities, in comparison with other projects carried out for the news media. However, he stresses that each dataset will always have its own unique features, which requires a clear understanding of the API provided by Mediafin.

The field of application is characterized by a particular jargon, requiring a certain expertise. If this expertise is in the field of journalists, the linguist in charge of coding the first version of the texts indicates that she must have done a lot of documentation about an area with which she was unfamiliar: " *I eat, I drink, I sleep purse for the moment… thanks to the journalists who work on it* " [25].

Although it acts as an actor within an editorial process, Syllabs does not consider that the automatic generation of journalistic content is assimilated to a journalistic activity. " *We have banned the phrase 'robot journalist' because it can arouse the fantasy of the robot replacing the journalist. It's about transforming data into texts that are quite mechanical. This is not journalism because there is no angle or in-depth analysis* », Underlines the co-founder of the start-up [26]. This position is shared by all of our contacts at Syllabs. For the project manager, the image of the "robot" also evokes that of a science fiction character who obscures the important part of the human being behind the editorial engine. He also recognizes

ment the limits " *of the generation itself or of what a tool can analyze. In journalism, there is a certain amount of subjectivity. We are not able to have it because we are in the rationality* " [27.]

During an exploratory interview, the representatives of Syllabs also admitted another limitation which is not of a technological nature: " *The people who work here are engineers and linguists. We realize that they lack editorial training in writing. People who have studied language science are not necessarily writers. Their approach to the language is very technical* " [28.]

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## V**S** onClusion

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By transforming data into texts or visual representations, automated information systems are integrated into an editorial process aimed at answering two questions: "what to say" and "how to say it" (Danlos, 1991). In this process, the choices made are not very different from those made during a traditional editorial process, when it comes to formalizing a set of rules, routines and institutionalized procedures, under - extended by professional expertise (Lewis & Westlund,

2015). To the extent that they reflect human intentions and involve value judgments, none of these choices can be considered "neutral" (Gillespie, 2014).

The design of "Quotebot" is part of an editorial project where the sharing of tasks between the different social agents involved in the project is clearly defined. Expertise in the field of application will come from the world of journalism, while that of technology will come from the world of technology. The separation between these two worlds is unequivocal: the line of demarcation is here drawn by a border object (Flichy, 1995) - the artefact of automation - which, as an object of negotiation, constitutes the meeting point. between these two worlds. The figure of the mediator appears here as fundamental to ensure a good transmission of information between all the stakeholders.

When the agents of the world of journalism are summoned to lay the foundations for the automation system, they will upset a way of doing things at Syllabs, which will have to reorganize

its usual workflows. Although its technology was not specifically designed for journalistic purposes, it will be subject to a "tailor-made" adaptation while taking into account the constraints posed by its technology. The technology here will therefore potentially reproduce and embody professional journalistic standards (Domingo, 2008, Anderson, 2013).

By acting as a content provider, Syllabs exercises an editorial activity, although its position is not to claim the exercise of a journalistic activity. As an actor in an editorial process, it is nevertheless involved in the construction of journalistic meaning: this is the whole ambiguity of its positioning. Although journalism seems here seen less as a professional ideology than as an occupational activity (Deuze, 2005), the opposition of the rationality of technique to the subjectivity of journalism testifies to distinct professional standards, inducing a different view on the nature of journalism and its processes (Lewis & Usher, 2014).

While it is now accepted that journalists should develop a form of "computational thinking" (Gynnild, 2014, Karlsen & Stavelin, 2014, Linden, 2017), with a view to fostering dialogues with computer scientists, the reverse should also be true. Social agents in the technical world should develop "journalistic thinking", to facilitate mutual understanding and even better adaptation to processes which cannot be seen in the same way as in other fields, such as communication. communication or marketing. This implies a paradigm shift: before being technical, the activities of automated news production should first be seen as journalistic.

Some go further, suggesting that the practices of programmers who are part of the "new technological world of journalism" should be marked out by a specific code of ethics (Monti 2019), taking into account the social responsibility of the media. Beyond these considerations, it appears that the actors of this "new world" participate in blurring or crumbling the contours of the journalistic profession (Ruellan, 1992, 2005), implying a rethinking of what journalism is: who does it? (Primo & Zago, 2015).

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