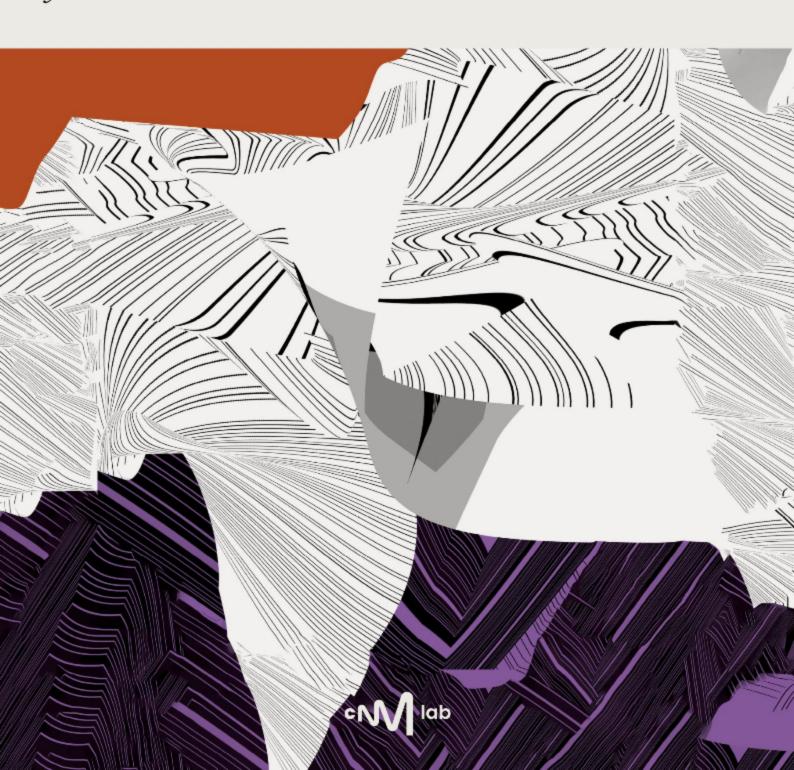# Data in Music

## Challenges and investment strategies

*By Julie Knibbe*

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# Knibbe Julie

Julie Knibbe founded Music Tomorrow, a company specializing in data intelligence for the music industry. She has over ten years' experience in developing innovative data solutions for players such as Deezer, Soundcharts, Sacem, Bandsintown, Revelator and Believe, and has launched flagship features such as Flow, interactive radio and playlist recommendation at Deezer.

# Introduction

Every day, between 60,000 and 100,000 new songs are being uploaded onto streaming platforms: [1] an underestimated figure which is bound to increase if we take into consideration the development of networks such as TikTok, gaming platforms and even livestreaming. At the same time, the number of broadcasts (radio, TV, downloads and streams) that collective management organisations have to analyse has gone from several billion to almost 20 billion billion since 2021. In a report titled *Drowning in Data*, the royalty management software company Synchtank forecasts that the volume of streams will continue to grow at a minimum rate of 20-30% every year over the next decade. [2]

This increase, which is characteristic of the music industry's digital transition, goes hand in hand with the generation of vast volumes of data. Because every song streamed has metadata. That is, music metadata is qualitative or quantitative information about a given song or digital action. There are generally three types, in no particular order:

- Information concerning the recording: title of the song, album name, performers, record label, release date, music genre (as stated by the artist or record label), album cover, lyrics, links to the different platforms, etc.
- Metadata on the audio signal: duration, genre/sub-genres (as deduced through audio analysis), ambience, key, mode, volume, tempo, etc.
- Metadata relating to rights: artist-performer, producers, authors, composers, arrangers, publishers, sub-publishers and their respective distribution share.

Furthermore, each action, such as a stream, a post on social media or even the online purchase of a concert ticket, has its own digital footprint. This data is collected from different sources (music streaming platforms, digital ticketing platforms, social media, etc.) and comes in different forms:

- Consumption data: the number of streams, the number of times added to a library or included on a playlist, skip rate (skipping a song without having listened to it), average listening time, relative popularity, etc.
- Demographic data concerning audiences, such as their age, gender, geographic location, music preference, purchase history, watch history, etc.
- Data related to tours and concerts, such as the number of tickets sold, the concert schedule, concert venues, associated revenue, etc.
- Data on song lyrics, such as the number of words, the number of lines, themes and keyword frequency, etc.
- Data on the artists, authors and composers, such as their biography, discography, music production, online activity, etc.

The upkeep of storing, analysing and monetising this data is complicated and costly, which can hinder industry growth and profitability. Nevertheless, industry professionals do have a unique opportunity: they could use this data to improve process automation, better understand their audiences and personalise their approach so as to maximise their impact.

# 1. Data essential in all business areas

Today, data processing and analysis are an integral part of the majority of jobs in the music sector. Mastering these activities has become a key skill for success: anyone working in the music industry is definitively connected with data.

Data plays a crucial role for professionals when it comes to decision making and marketing and promotion strategies. Thanks to these tools, they can understand people's listening behaviour, personalise strategies, and guide an artist's career. In fact, data processing is used for keeping pace with market trends and the public's expectations. As such, labels use community engagement metrics to choose promotion channels for their artists, like promoters who examine an artist's ticket sales history at a venue before booking a new show. Data also concerns artists: they rely on metadata linked to the audio signal to explore vast sound banks, with the more inquisitive artists exploring the use of artificial intelligence algorithms to help them in the creative processes (Table 1).

*Table 1: Use cases and examples of data used by people in the music industry*

| Person | Example of use case | Example of data used |
| --- | --- | --- |
| Artist | Effectively use production software and creativity support tools | Metadata related to audio signal analysis (exploring a sound bank using filters on instruments, tempo, BPM, etc.) |
| Artist manager | Promote their artist to potential partners (record label, distributor, publisher, etc.) | Number of streams and followers reached. Progression of monthly listeners on streaming platforms. Progression of followers on social media. Engagement rate on DSPs and social media. Press/radio pickups |
| A&R (artists and repertoire) | Assess an artist's profile before signing them to a record label to determine their potential and development goals | In addition to the metrics listed above: Check for fake streams Compare their data with artists with potentially similar career trajectories |

| | | |
|---|---|---|
| Record label/label services | Develop an artist's audience | In addition to the metrics listed above: Fan conversion ratio on different platforms Engagement rate of the various promotional channels (playlists, influencers, media, etc.) |
| Distributor | Optimise catalogue revenue | Revenue growth and distribution by territory, type of plan and platform Analysis of growth vectors Metadata audit |
| Publisher | Develop an artist/composer's catalogue | Works and publishing/sub-publishing contracts Reports on how works are used (CMOs royalty distribution) for revenue analysis and audit (tracking) |
| Agent/booker | Assess an artist's profile for an event or a venue booking | Metrics for managers, A&R and record labels, filtered and cross-referenced for a given city and country: Fans and followers in a city + analysis of radio airplay and local promotional activity + ticket sales history Sales growth Ticket sales rate |
| Promoter | Organise an event | In addition to the metrics listed above: Arrival/departure times Contact tracing (Covid) Purchases during the event (catering, merch, etc.) Resales on secondary markets CRM monitoring |

David Mahieux, head of data at Warner Music France, recently explained to the online media FrenchWeb how his team uses data to make streaming projections: "With our Hype Habits project, we show how the songs on a setlist at a concert in a certain geographical area will have a post-show impact on what songs are streamed in this area." [3] In other words, the choice of songs played in concert then influences listening on streaming platforms. An internal video shows how Ed Sheeran was "fascinated" by this development, which allows him to optimise listening differently on platforms after a concert, whether in Paris or Puerto Rico.

Every year, Music Tomorrow conducts an international survey amongst professionals in the music industry to report on current data processing practices. Nearly 80 companies in the sector responded to a questionnaire made up of around 40 questions, reporting on their data processing and analysis practices. In 2022, 68.6% of music professionals surveyed said they use data at least once a day (in 2021, this rate was 48%). [4] Data is not only the fuel that powers the digital music industry, but it is also the foundation on which thousands of professionals base their operational and strategic decisions.

Music industry professionals have access to a number of tools and dashboards, aggregating sometimes tens, even hundreds of different data sources. Knowing how to make good use of these dashboards is just one of many new skills to master. Training and support is required in order to get to grips with them, and training institutes specialising in the music sector now include specific data analytics, as evidenced with courses at the Berklee College of Music, the French *Centre national de la musique* (CNM) or the *École de management et des industries créatives* (EMIC). Furthermore, this year many companies made their first recruitments of data analysts and data scientists to analyse this data and develop their own solutions. 76.5% of companies surveyed (all sectors combined) have in fact planned to increase their data management and analytics budgets in 2023. [5]

Music industry professionals' attitude towards data has evolved considerably in recent years. Despite initially expressing a certain distrust of these new working methods, they increasingly understand the value they can derive from data analytics to help them in their work. As the topic develops in maturity, there is less and less debate in which intuitive approaches (where artistic quality prevails) are brought into opposition with data-driven approaches.

# 2. Sector-specific challenges

The music industry is characterised as being fragmented and complex, and this is often reflected in its data management. The different industry players often manage their own databases independently, to respond to their own specific challenges. They use different information systems and methods to collect, store and analyse data, which can make it difficult to compare and use data together.

## Recorded music

The recorded music industry must confront the major challenge posed by the attention and creative economies: to make a song or an artist stand out from amongst thousands, even millions of songs, in a world where listeners' attention is solicited from every direction. Professionals use data as a tool to reduce the risks and optimise their investments.

Today, artists and their teams have access to key data on music consumption and listener behaviour from nearly every player in the music value chain, including but not limited to music and video streaming platforms, social media, radio stations, television channels and more generally speaking, the broadcasting industry. Streaming platforms provide tools to monitor listening in real time, such as Deezer Backstage, Spotify for Artists or Apple Music for Artists. Distributors provide an aggregate view of this data, and market intelligence platforms such as Chartmetric and Soundcharts can consolidate this information with additional statistics on an artist's social media or radio airplay performance.

The recorded music industry has a major advantage compared to live entertainment and music publishing industries: the data generated by digital platforms directly concerns recordings. One stream on a streaming platform is directly identified by an ISRC (international standard recording code), which is linked to a song title and its performers. Although this standard is still not perfect and a recording is still often associated with multiple ISRCs, [6] monitoring whenever a song is performed is made much easier thanks to the various tools mentioned above.

Developing an artist's careers involves many processes and challenges related to data, and the same applies to talent scouting: faced with the impossible task of listening to all new songs, A&R representatives resort to market intelligence tools to identify and assess the artists with whom they plan to collaborate. Similarly, to optimise promotional and digital marketing campaign performance, professionals rely on data targeting, which they adapt in real time according to their campaign results. However, attribution issues, i.e. the difficulty in linking a stream on a streaming platform to an external source, such as a post on a social network, prevent the sector from matching the advertising performance of other industries. [7]

To keep up with the constant increase in the number of songs distributed, platforms have implemented and then improved recommendation algorithms, with the aim of offering the right song to the right audience. From home pages to playlists, all these platforms' key features are adapted according to a user's profile. For example, according to Spotify's 2022 *Made to Be Found* report, more than a third of all new artist discoveries on the platform occur through personalised features like Made For You playlists. [8]

Being successfully identified and classified by these algorithms so as to be presented to the appropriate targets, in other words developing online discoverability, is a major challenge for the recorded music industry. Professionals often rely on these algorithms to increase their artists' visibility and to optimise investments made on digital platforms. The issue of discoverability is as much linked to the release of new tracks as it is to developing back-catalogues. Optimising data to capitalise on existing catalogues is key for the sector. To achieve this, professionals try to understand the basics of how these algorithms work and to adapt their strategies, both in distribution and in marketing, in order to capitalise on them. However, a recent report from the British government on the impact of algorithmic recommendations on the industry underlines the extent to which the lack of information and training on these subjects is felt:83% of the creators surveyed disagreed or strongly disagreed that streaming platforms give sufficient information about how recommendations are made to consumers, and 89% expressed a desire for more detail as to how recommendations are made. [9]

The rise in fake streams was also the subject of a recent study by the *Centre national de la musique*. [10] Platforms such as Deezer, Qobuz and Spotify cooperated in the study by providing data on fake streams detected on the French market. This survey, which is the first of its kind on this subject, has shown the importance of the fight against fake streams to ensure that rights-holders are fairly compensated for their work. However, there are still

many challenges to take on if adequate solutions are to be found. The study shows the need for full cooperation from industry players, and the need to provide solutions for professionals in order to better understand and control their visibility on digital platforms.

## Music publishing

The publishing sector is facing similar challenges when it comes to developing songwriters' careers. In addition to this, it must also tackle sector specific challenges related to data, in particularly metadata.

Most companies which monetise or license music recordings and works on a wide scale – streaming platforms, social media, concert venues, etc. – rely on metadata related to rights in order to compensate the main rights-holders. Those with interests in the recorded music generally enter into direct agreements with streaming platforms: these then declare any sales and pay the rights-holders directly on a monthly basis.

However, the publishing sector is subjected to much longer time periods between the moment a songwriter releases a song and the moment when they receive their first payment – around six to twelve months after the song was first released. Not only are direct agreements between publishers and streaming platforms uncommon, but publishing rights management varies considerably from territory to territory. Depending on the country, one company may manage both mechanical rights and performing rights (for example, Sacem in France or Apra/Amcos in Australia), or several different companies may each be responsible for collecting a specific type of rights. Furthermore, the exact splits between mechanical rights and performing rights, and between songwriter and publisher shares, differ from country to country, and are often based on government regulations.

All of these entities need to know who is involved in a given work and recording, in order to properly allocate royalties generated. It is important to note that these platforms rely heavily on metadata that the artists and rights-holders they themselves provide. If the latter fail to give platforms complete or accurate information – or if they simply do not submit information about their works – the platforms cannot trace revenue back to its rightful owners.

The number of entities involved in rights-related metadata management makes this metadata extremely difficult to manage. Companies must implement a rather considerable level of technical expertise is they are to even filter the simplest section of metadata, such as the identifier of a work.

According to Blokur, a startup which provides automated metadata conflict detection and reconciliation services, only 30% of the songs in publisher databases have an identifier assigned to a work (an ISWC, or international standard work code), which is an optimistic average. [11] Although metadata management solutions, such as Synchtank and Blokur, aim to solve this problem on a large scale, metadata challenges remain at the forefront of publishing activities. [12] For the majority of publishing companies who took part in our survey, metadata management is the priority for future data-related investments. [13]

To date, there is no industry-standard central database documenting information concerning rights ownerships for musical works. So far, attempts to build such a tool have ended in failure. Perhaps the most notorious example is the Global Repertoire Database (GRD), an industry-wide initiative founded in 2008 and backed by investment from a coalition of publishers and collecting societies, with the aim to provide "a single, comprehensive and authoritative representation of the global ownership, administration and control of musical works," in the words of the collective management organisation PRS for Music. After six years of back and forth and significant investments, the GRD was finally sidelined due to collective societies' difficulty and reluctance to share rights data openly. The main lesson to be learned from the fallout from the GRD is that existing delays in financial innovation in the music industry have been as much a political and contractual issue, as a technical one.

The ambition behind this specialist database is now back in the spotlight with the Verifi Rights Data Alliance initiative which launched in early 2022. [14] Its first four members, Warner Music Group, Deezer, FUGA and Unison, have planned to create a reference source for sharing music rights data linked to recordings and works, in which each entity retains control of its own proprietary data source.

The publishing sector is fully focused on this issue: the priority has been put on rights-related metadata processing and management in order to accelerate financial flows. Added to this are issues related to the traceability of when a work is used and improving visibility of when a work is performed. Publishers need to have a complete view of how their musical works are performing in order to be able to plan and develop their marketing strategies. However, data fragmentation makes it difficult to collect and analyse data to obtain this aggregation. This is because performance data is associated with recordings, not works. The global music value chain currently favours value creation (and data creation) at the performer level, not at the songwriter level. So in order to monitor performance, recordings need to be able to be linked to the corresponding works, which again raises the question of metadata and sharing it widely throughout the industry.

## Live entertainment industry

In the same way, the live entertainment sector is also confronting unique challenges related to data ownership and data sharing between entities, as well as the associated technical, political and regulatory issues, such as the protection of personal data. Data specific to live industry professions such as ticket sales, venue capacity, sales history, etc., are often fragmented between multiple entities and platforms (several ticketing platforms, several venues, different CRM tools, etc.). [15]

When data is collected, professionals in the sector encounter lots of difficulties in accessing and interpreting it. Gathering this information in dashboards is an obstacle course, and more and more solutions such as Arenametrix and RealCount aim to solve this problem. Furthermore, due to existing silos, securing access to data from artists and record labels is often laborious for live industry professionals, depriving them of valuable data sources for

concert programming or targeting audiences. They often use dashboards or third-party solutions such as Chartmetric or Soundcharts to crunch an artist's numbers despite the fact that they work with the artist's teams.

On another note, the non-digital nature of a live performance experience makes it even more complicated to collect and process other types of data. One major opportunity which remains untapped in event data analysis concerns qualitative rather than purely quantitative data. What was the crowd atmosphere and audience reaction like? What is a reliable way of measuring the impact of a show?

According to Live Nation, 68% of fans who went to a gig shared the experience on social media. That said, while measuring merchandising sales is easy, measuring the impact of what is posted on social media is more difficult, as artists or venues are not always tagged in such content. Apart from Pex's attribution engine, very few entities are able to monitor this user-generated content at scale, and almost no options exist to link this data with CRM.

Livestreaming and, more generally, experiences offered in virtual environments also present an opportunity to the extent that these have had a significant impact on the way in which artists, booking agents and promoters incorporate and share data before, during and after a show. Given that everything that happens online is measured, data concerning online events and shows is becoming more accessible than ever before. "One of the main differences now is that the artist is really the promoter," says Diana Gremore, RealCount founder and former business intelligence analyst at Paradigm. [16] "You can't really rely on a promoter as much as you would normally to sell tickets. The potential audience is now wherever your fanbase is, and not just the promoter's usual geographic market." Furthermore, the meaning of "local" marketing takes on a whole different form online, that is, according to Gremore, "instead of events being geographically local, they are local to online communities." [17]

As such, artists and their managers can have access to more data about their events. More specifically, they can interact directly with fans, obtain statistics on their behaviour and eventually add their contact details to the artist's CRM — activities which are generally difficult to do in the physical events sector, where the promoter does not always have the opportunity, nor be in a position to share this information with the artist.

This means that there are now more direct conversations between managers, records labels, booking agents and promoters about event data ownership. Recent transactions, such as BMG's acquisition of the independent concert promoter Undercover and Eventbrite's recent acquisition of ToneDen, a marketing platform popular amongst artists and record labels, demonstrate how this quest for additional data is driving companies that were previously siloed to converge faster than before.

Up until recently, data collected during an event was used mainly for profitability and marketing purposes; to ensure that logistics and operations were running smoothly and that the event was profitable, and to learn about fan behaviour during the event, so as to

optimise subsequent shows and develop targeted post-event marketing campaigns. Since 2020, the need to track people's movements during the Covid-19 pandemic has enabled the rapid development of a new generation of event monitoring tools (Aloompa, Appmiral and even atVenu), which can trace concert-goers' actions and movements, at a much faster pace than expected. [18]

# 3. Innovation and investment strategies

If the overview of issues specific to each sector outline differences in the relationship to data within the music ecosystem, data-driven innovation and investment opportunities make it possible to envisage common perspectives for all entities involved.

First of all, for the majority of independent record labels who continue to work with spreadsheets – 47% of companies questioned in our survey [19] – the priority will be to equip themselves with the right tools, recruit and train if they want to integrate data analysis in their daily processes.

On the other hand, the most advanced practices in terms of innovation concerning music data are used by the biggest companies, in particularly those in the recorded music sector. They have easy access to the largest data sets, which gives them a major advantage. As such, streaming platforms, major labels, distributors and collecting societies are the figureheads when it comes to adopting emerging big data technology, such as prescriptive analytics or artificial intelligence. [20] As these types of algorithms require at least tens of thousands of data points to operate, the majority of independent record labels do not have the data sets nor sufficient technical and financial resources to develop them.

This disparity in terms of access, tools and skills thus accentuates the gap between the biggest names and the rest. Companies with the resources and skills to develop these cutting-edge algorithms have a competitive advantage over others, which could increase economic inequality in the longer term. Furthermore, algorithms trained on incomplete or biased datasets can reflect and perpetuate existing biases in the industry. In addition, issues related to data sharing and confidentiality often prevent the startup ecosystem from getting their hands on of valuable private datasets, favouring startup acquisitions or partnerships with larger players.

## Improve quality and make data exchange run more smoothly

As we saw in the previous section, lots of investments involve improving quality and making data exchange run more smoothly. Collaboration between different entities and data sharing is key for innovation in the sector. Silos, legacy systems, data confidentiality and lack of qualified workers to structure data collection often prevent key data from being

shared. In 2022, several data hub initiatives, such as Gaia-X [21] and even Verifi Rights Data Alliance, emerged to overcome this problem, but just like DRM, they will have to face both political and technological challenges if they want to succeed. In addition, many initiatives to improve standards [22] and formalise data sharing are trying to overcome the difficulties mentioned above. [23]

Tools from the Web3 movement, [24] which aims to build the next generation of the internet that is decentralised, transparent, secure and participatory, also present opportunities. For example, new tools such as Revelator's Artist Wallet can record data relating to music copyrights on a blockchain database to make royalties payments more reliable, while others enable creators to establish evidence of when a work was created, such as Sacem's Musicstart project. Again in the area of royalties, Sacem recently announced a partnership with Pianity, a startup that creates music non-fungible tokens (NFT). [25] These projects, based on established "Web2" players' expertise and know-how and integrating Web3 innovation, show the development of decentralised, blockchain-based solutions. However, these projects are isolated and NFT metadata standards do not yet exist. [26]

# 4. Solutions for finding information and facilitating decision-making

Once data has been collected and shared, another investment strategy is to develop solutions for finding the relevant information among this increasing volume of data: the growing number of creators and data generated means data can no longer be processed manually. Processes for discovering artists, new signings or even monitoring must now integrate a certain level of data mining in order to keep pace. From anomaly detection in sales reports to optimising a catalogue's performance, to advanced discovery and filtering services for A&R, professionals are increasingly using big data technology and services to help them in their daily tasks.

Industry professionals have now become accustomed to consulting dashboards to monitor their activities. Having made this breakthrough, a new generation of personalised tools based on predictive and prescriptive analysis algorithms is emerging. Prescriptive analytics is a form of analytics that uses algorithms and modelling techniques to determine the best course of action for a given situation. It is future-focused and relies on historical data to predict the possible outcomes of a given action and recommend the best solution. Prescriptive analytics differs from descriptive analytics and predictive analytics in that it not only describes or predicts trends in data, but also provides actionable solutions and recommendations to achieve specific goals.

Descriptive and generalist analytics solutions like Soundcharts and Chartmetric continue to grow, but as a complement to task-specific prescriptive analytics solutions. Players in the

sector are now investing in the industrialisation of artificial intelligence algorithms specific to their operations in order to improve and automate certain decision-making processes, such as forecasting ticket sales, forecasting a catalogue's financial flows, or forecasting the performance of a marketing campaign, etc. From the development of marketing campaign automation technology like Ingrooves, to the presence of algorithmic optimisation offered by Music Tomorrow, a new ecosystem of techniques and tools is taking shape. [27]

The use of generative artificial intelligence is also noticeable for assisting not only creation, but also decision-making. The end of 2022 will be remembered for the launch of ChatGPT, an artificial intelligence chatbot capable of talking and generating articulate knowledge on many subjects. Artificial intelligence is not only able to generate songs, but also create images on-demand from a verbal prompt (DALL.E) that can be used as album covers, songs, lyrics, or even as a reference. The most well-informed professionals are adapting to in order to use these new tools, whose possibilities extend well beyond creative production. For example, a record label can use ChatGPT to generate its external communication templates, and an agent to produce a press kit, etc.

# Conclusion

At a time when billions of new data points are generated every day, the music industry is doing its utmost to ensure it runs smoothly and is capitalising on this potential to design new services. While rather late to adopt big data and AI technology due to the difficulty of collecting, cleaning and processing large datasets, industry professionals are now displaying a willingness to develop.

These are exciting times: artificial intelligence, which had lost some of its appeal during the recent Web3 and NFT craze, is once again in the spotlight since OpenAI launched ChatGPT at the end of 2022. This announcement has brought back in the headlines this ecosystem whose development shows no signs of slowing down.

However, understanding the main principles of these algorithms and how they operate will remain essential in order to take full advantage of them. Manual data processing is no longer an option. A new generation of data exploration and decision support tools based on artificial intelligence algorithms is developing intensely, supporting the rapid growth of data volumes in the sector: the growing number of engineers recruited bears is evidence of this. Despite everything, it is crucial to continue investing in all the professions which maintain knowledge of these technological solutions, especially in less specialised professions which will be in a position to carry out the necessary job of popularisation and training others, so that they are adopted wisely by everyone.

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