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## 1. INTRODUCTION



The ABOOH DOOH Metrics Standard establishes a universal, open framework for audience measurement in Brazilian digital out-of-home advertising. It defines a common vocabulary of terms, conditions, formulas, and data transformations that harmonize the diverse methodologies currently used by publishers, data providers, and measurement companies across Brazil's OOH market.

### 1.1 OBJECTIVE

The objective of this standard is to unite ABOOH members under a single, open metrics framework for audience metrics. It has three interconnected goals:

#### 1.1.1 EASY

The standard shall be immediately deployable by adherents with minimal implementation burden. Compliance is achieved through the completion of a Confidential Disclosure of Method document — a sworn statement in which the adherent declares all data sources, transformations, algorithms, and assumptions used to produce their audience metrics. No new data collection infrastructure is required; existing measurement systems are mapped to the standard's terminology and output requirements.

#### 1.1.2 UNIVERSAL

The standard shall be universally interoperable, both within the Brazilian OOH market and with the broader omnichannel advertising ecosystem. Internally, it harmonizes the diverse methodologies of Brazilian publishers, measurement providers, and data companies under a common vocabulary of terms, definitions, and transformation rules.

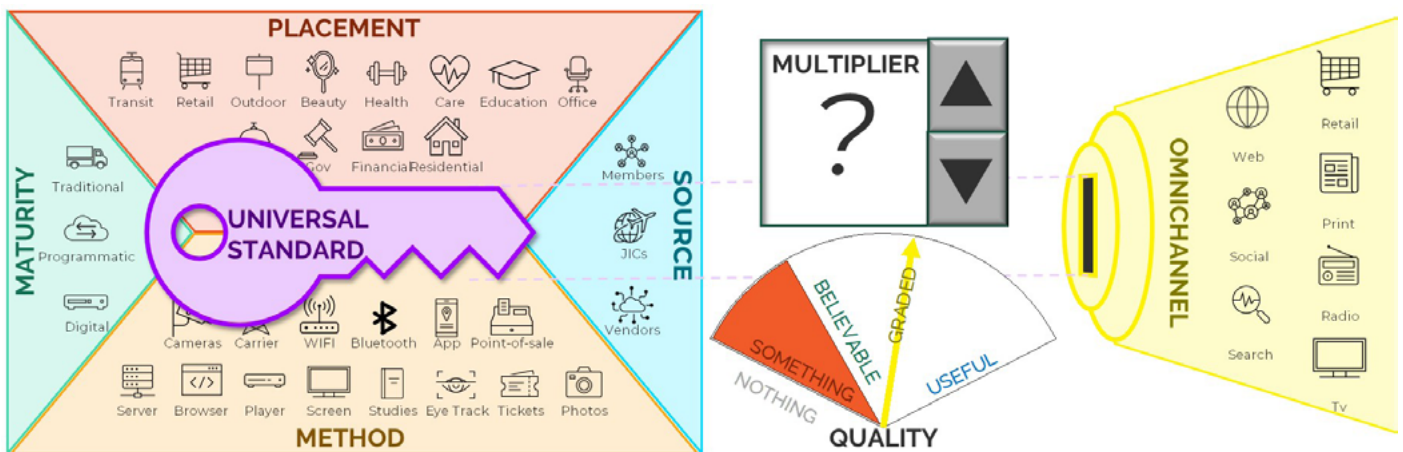
Externally, it is designed to interoperate with established international metrics standards (including but not limited to IAB, MRC, and WOO frameworks) and to produce currencies recognized across digital advertising platforms including viewable impressions (VCPM), likelihood-to-see (LTS), and visibility-adjusted contacts (VAC).

### 1.1.3 COMPETITIVE

Adherents to the standard shall be positioned with the strongest possible value proposition in omnichannel media buying. By producing accurate, auditable, and algorithmically reliable audience metrics, standardized DOOH inventory becomes a premium starting point for campaign allocation decisions. In programmatic advertising environments where algorithmic budget distribution rewards data quality and penalizes inflation, adherence to this standard maximizes OOH's share of wallet relative to competing digital media channels.

### 1.2 PROBLEM

Out-of-home advertising faces a structural disadvantage in the programmatic advertising ecosystem, which this section identifies as the “Data Problem.”



#### 1.2.1 THE IMPRESSION MULTIPLIER REQUIREMENT

Unlike all other digital media channels, which assume an audience of one per ad delivery, programmatic DOOH operates through an optional field in the real-time bidding protocol known as the \*impression multiplier\* -- a data layer that quantifies the audience size at the time of each ad play. This additional layer introduces operational complexity that does not exist for digital competitors in the omnichannel. Every DOOH

campaign requires not only the logistical pipeline of creative delivery and scheduling, but also a separate and parallel pipeline of audience measurement, transformation, and validation. This dual-pipeline requirement increases cost, latency, and points of failure relative to single-pipeline channels.

### 1.2.2 ABSENCE OF A QUALITY STANDARD

There is currently no recognized quality standard governing the impression multiplier. In the absence of such a standard, publishers and data providers produce audience figures using heterogeneous methodologies with no common basis for comparison. A tendency exists toward overstating audience size -- an approach that appears advantageous in isolation but is self-defeating in practice. The primary mechanism for allocating advertising budgets in programmatic environments is an effectiveness-based algorithm that continuously evaluates which inventory delivers results relative to targets. Inventory with inflated audience data underperforms against expectations, causing the algorithm to deprioritize it. Overselling therefore costs share of wallet.

### 1.2.3 METHODOLOGICAL FRAGMENTATION

The problem is compounded by the extreme diversity of measurement sources and methodologies in the OOH sector, particularly in DOOH. Audience data may be derived from any combination of sensor technologies (computer vision, Wi-Fi sensing, Bluetooth, mobile SDK, panel extrapolation, GPS aggregation), each with its own detection logic, calibration requirements, sampling properties, and error characteristics. The variety is further multiplied by venue type (transit, retail, street furniture, mall, elevator, stadium), display placement, viewing environment, and the international or domestic origin of the data supplier.

This fragmentation produces a landscape in which each publisher's output is effectively a different currency. There is no mechanism for an advertiser or agency to compare the audience value of one DOOH network against another with confidence, nor to compare DOOH against digital channels on a common basis. Without a harmonization framework, this tapestry of incompatible metrics products remains a barrier to OOH's participation in omnichannel campaign planning at scale.

## 1.3 SOLUTION

The solution to the Data Problem is a carefully architected common metrics pipeline that harmonizes the full diversity of OOH audience measurement sources into standardized, multi-currency outputs. By resolving the measurement inconsistency that currently limits DOOH’s programmatic competitiveness, OOH is positioned to establish itself as the premium medium in the omnichannel.



### 1.3.1 UNIVERSAL HARMONIZATION PIPELINE

The standard defines a transformation pipeline capable of accepting inputs from any source modality — sensor detections, mobile data, panel surveys, computer vision outputs, Wi-Fi logs, and others — and producing a common set of output metrics. The pipeline is source-agnostic: it does not prescribe how data is collected at the point of detection. Instead, it prescribes what data must be collected, how it must be recorded, how raw detections must be sanitized, converted, adapted, and adjusted, and how the final metrics must be reported and disclosed.

This architecture ensures universal compatibility. Existing measurement infrastructure operated by Brazilian publishers and data providers requires no replacement — only reconfiguration to comply with the standard’s input specifications and output formats. The “black box” nature of current methodologies is replaced with a “white box” framework in which the transformation logic is fully declared, even where the underlying detection technology remains proprietary.

### 1.3.2 MULTI-CURRENCY OUTPUTS

The pipeline is designed to produce results in multiple advertising currency formats simultaneously, ensuring interoperability with the full range of downstream buyers, agencies, and omnichannel planning systems. From a single harmonized data foundation, the standard generates the lower-level currencies that advertisers use to plan, buy, and evaluate campaigns:

**Viewable Impressions (VCPM):** Ad exposures delivered at a sufficient quality to be potentially observed by a member of the audience.

**Reach and Frequency (CPR):** The count of unique individuals reached and the frequency of impressions delivered to each.

**Complete Views (CPCV):** For dynamic or video-capable DOOH surfaces, the count of ad exposures that ran to completion under viewable conditions.

The above currencies are already traded in large volumes on other digital media giving DOOH access to new potential markets.

### 1.3.3 COMPETITIVE POSITIONING

DOOH holds a structural advantage over all other digital media channels: it is physically verifiable. An advertiser or agency can walk to a billboard or screen, observe the ad playing in real time, and see the actual audience consuming it. This stands in direct contrast to social media, search, and display advertising, which occur as private digital events with no mechanism for physical verification and consequently higher exposure to fraud through bots, falsified impressions, and non-human traffic.

By supplying accurate, standardized, and algorithmically reliable audience data, DOOH inventory compounds this inherent verifiability advantage. The standard eliminates the inflation incentive that currently undermines DOOH's algorithmic performance, replacing it with a credibility premium. Inventory measured under the standard carries verifiable quality that allows it to compete on equal footing with established digital channels while offering something they cannot: proof of presence that anyone can witness with their own eyes.

## 1.4 PROPOSAL

Rather than requiring each publisher and data provider to develop independent terms, conditions, and definitions for their respective metrics, this standard establishes a unified framework to be adopted industry-wide. Compliance is achieved through a

self-declaration process. Participating organizations complete a standardized template known as the Confidential Disclosure of Method, which functions as a sworn statement or affidavit detailing their specific measurement methodology, data sources, and transformation logic.

Upon completion, this disclosure is referenced directly in the publisher's campaign invoices and reporting deliverables. This establishes the document as the binding terms and conditions governing all reported metrics, providing legal enforceability and buyer confidence without introducing a centralized auditing gate for every transaction.

## 1.5 CONTENTS

This standard is organized into four modules, each designed for a specific audience and purpose.

### 1.5.1 INTRODUCTION

The introduction section, which the reader is currently reviewing, explains the rationale for the standards initiative, its governance, its relationship to existing international frameworks, and the structure of the document as a whole.

### 1.5.2 RECRUITMENT

The recruitment module provides the market context for standard adoption. It establishes the business case by demonstrating how the absence of measurement standards limits DOOH participation in the omnichannel, how ad currency fragmentation reduces revenue potential, and how adopting the standard resolves these limitations. This section is intended for executives, sales teams, and any stakeholder who must be convinced of the commercial value of compliance.

### 1.5.3 STANDARD

The standard module contains the technical specification: the definitive definitions of all metrics, the architecture of the transformation pipeline, the viewability and discoverability requirements, and the taxonomy framework. This section is intended for data engineers, ad operations teams, and measurement specialists who must implement the standard in practice.

### 1.5.4 COMPLIANCE

The compliance module specifies the method by which source metrics are transformed into standard metrics, including the confidentiality framework, governance requirements, transformation pipeline stages, and fidelity standards. This section is intended for compliance officers, data providers, and any party responsible for completing the Confidential Disclosure of Method document.

## 1.6 FORMATS

This standard is published in two complementary formats, each serving a distinct audience and use case.

### 1.6.1 SPECIFICATION

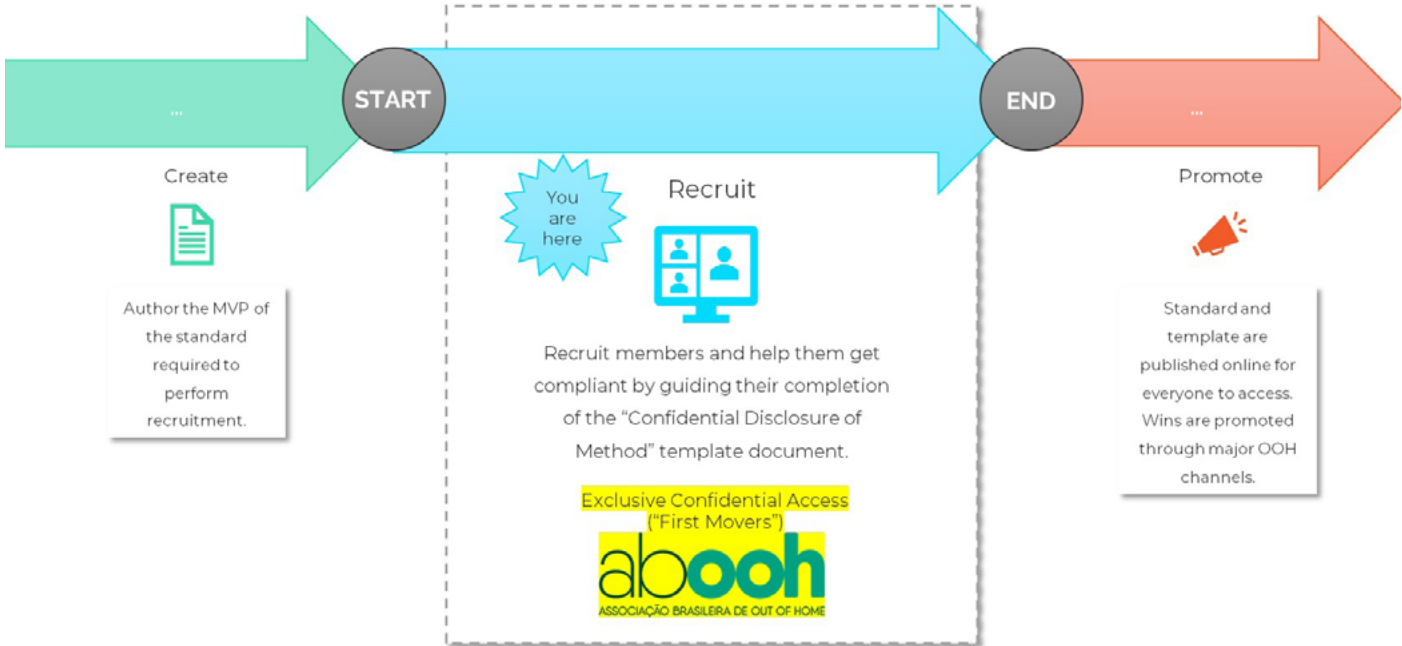
The specification is the definitive technical reference — a comprehensive PDF document containing the full formal definitions, pipeline architecture, transformation rules, and compliance requirements. It is structured as a normative standards document intended for data engineers, measurement specialists, and compliance officers who require complete technical precision and implement the standard in production systems. [Printable PDF for the document detailing the standard specification.](#)

### 1.6.2 PRESENTATION

The presentation is a slide-format summary designed for executive briefings, sales enablement, and stakeholder recruitment. It distills the specification's key arguments — the data problem, the multi-currency solution, the compliance model, and the competitive advantages — into a visual, accessible format. It is intended for executives, advertisers, and agency planners who need to understand the value proposition and commercial implications of standard adoption without engaging with the full technical specification.

## 1.7 TIMELINE

The initiative follows a three-phase rollout to establish early adoption before broad market release. The Create phase delivers the minimum viable specification required to begin recruiting initial adherents and onboarding their measurement methodologies. The Recruit phase focuses on first movers who complete the Confidential Disclosure of Method template with guided support, producing early compliance case studies. The Promote phase opens the standard and template for public access while publicizing adoption wins through industry channels to drive broader market participation.



## 2. RECRUITMENT



In this document, we establish the commercial imperative for adopting the ABOOH DOOH Metrics Standard. OOH advertising suffers from a structural disadvantage in the programmatic ecosystem not because it is ineffective - it remains the most effective medium per unit of spend - but because it cannot prove its effectiveness in the currencies, formats, and quality signals that algorithmic buying systems require.

### 2.1 OOH'S "DATA PROBLEM"

Out-of-home advertising faces a structural disadvantage in the programmatic advertising ecosystem, which this section identifies as the "Data Problem." The problem is not that OOH is ineffective - on the contrary, it remains one of the most effective mediums per unit of spend. The problem is that OOH cannot prove its effectiveness in the currencies, formats, and quality signals that algorithmic buying systems and digital media buyers require. The six subsections that follow decompose this problem into its constituent parts: the provability gap, the programmatic special case, methodological fragmentation, opaque measurement practices, and the of partial data products.

#### 2.1.1 THE "PROVABILITY GAP"

The term "provability gap" describes the discrepancy between OOH's actual advertising effectiveness and the industry's ability to demonstrate that effectiveness through data. OOH is the premium medium. It delivers a disproportionate advertising response relative to its share of wallet, and it remains the last mass-consensus medium in an age of atomized digital channels. Yet the data provided in OOH struggles to support the higher-level currencies that demand identity resolution and attribution chains - sales, engagement, clicks, installs, and acquisitions.



This gap exists because OOH’s unique strength -- reaching audiences in the physical world without requiring logins, consent agreements, or active interaction -- is also its measurement liability. Digital channels produce an exhaustive trail of behavioral events: clicks, scrolls, video completions, page views, and session durations. Each event is timestamped, attributed to a specific user identifier, and available for algorithmic evaluation. OOH produces physical presence, which is inherently more difficult to capture and translate into the attribution-based currencies that digital buyers use to allocate budgets.

The provability gap is not a reflection of OOH’s ineffectiveness. It is a reflection of the measurement industry’s failure to translate OOH’s physical outcomes into data products that are comparable, auditable, and consumable by programmatic systems. The data quality is not always low, but the method for proving its quality is inconsistent. Until the industry can demonstrate its effectiveness in a form that algorithms trust, OOH will remain structurally undervalued in automated buying environments.

2.1.2 PROGRAMMATIC SPECIAL CASE

Programmatically, DOOH operates through a mechanism that is unique among all digital advertising channels. When an ad is served through a real-time bidding protocol to television, desktop, mobile, or connected television, the system implicitly assumes an audience of exactly one per ad delivery. The creative is delivered to a single device, and one device implies one viewer. No additional calculation is required.

DOOH does not have this luxury. A single ad play on a digital screen may be viewed by zero people at three in the morning, by a handful of pedestrians during midday, or by hundreds of commuters during rush hour. To communicate this variability to the bidding system, DOOH uses an optional field in the protocol known as the “impression multiplier” -- a numerical value that quantifies the estimated audience size at the moment of the ad play.



The impression multiplier is both DOOH’s differentiator and its liability. It is the mechanism by which DOOH conveys scale -- the potential to reach dozens or hundreds of people simultaneously, a capability no other digital channel possesses. But it is also a source of inconsistency. There is no widespread technical standard governing how publishers calculate this value. One publisher may derive it from computer vision detections, another from mobile location extrapolation, another from historical census modeling. All three methods may produce plausible numbers, but they are not comparable, and no single authority validates them.

Currently, this inconsistency is not a critical operational problem. Programmatic DOOH represents only a small fraction of total DOOH spend, and impression multipliers are frequently treated as a secondary detail by media buyers running complex omnichannel campaigns. But as programmatic DOOH scales -- growing at approximately 240 percent year over year -- the absence of a standard calculation methodology will become a significant barrier to buyer confidence, algorithmic trust, and cross-publisher comparability.

### 2.1.3 FRAGMENTATION CHAOS

The inconsistency in impression multiplier calculation is a symptom of a much broader structural problem. The number of distinct audience measurement methodologies in OOH is roughly equal to the number of possible combinations between venue types, placement types, data provider types, and geographic jurisdictions -- domestic and international alike. On the provider side, a single OOH network might derive audi-



ence data from computer vision cameras, Wi-Fi probe collection, Bluetooth beacons, mobile carrier subscriber data, GPS aggregation, application-based SDK tracking, browser fingerprinting, player logs, photographic surveys, academic research studies, ticket sales data, or eye-tracking experiments. On the venue side, measurement requirements differ across transit, retail, roadside, airports, malls, elevators, stadiums, hospitals, fitness centers, hospitality venues, and educational campuses. Each venue presents distinct audience flows, dwell characteristics, and environmental conditions that affect how measurement must be applied.

On the standards side, local Joint Industry Committees such as Geopath and Route in the United Kingdom, Geopath in the United States, and MOVE in Australia each define their methodologies independently. International vendors operate across multiple jurisdictions with proprietary calculation frameworks. Foreign measurement bodies use different terminologies for functionally identical concepts -- what one body calls “Opportunity to See,” another calls “Opportunity to Contact,” and another calls “Likelihood to See.”

The result is a landscape in which every publisher’s output is effectively a different currency. There is no mechanism for an advertiser or agency to compare the audience value of one DOOH network against another with confidence. How can a consistent, trustworthy impression multiplier be produced in the face of this complexity? The answer cannot be for each publisher to calculate independently and hope the numbers align. It requires a common framework that accepts this diversity of inputs and produces consistent, comparable outputs -- a harmonization layer that sits above the detection technology and below the reported metric.

## 2.1.4 OPAQUE METHODS

Many of the principal actors in OOH and the broader omnichannel produce audience metrics through methods that are neither transparent nor reproducible. Two categories of opacity dominate the market.



The first is what might be called “black-box mathemagics -- mathematical transformations and statistical models whose inputs, assumptions, and algorithms are entirely enclosed within a proprietary system. The buyer supplies minimal configuration input and receives a finalized audience figure, with no visibility into the intermediate calculations, weighting factors, or quality adjustments applied between source data and final output. The number is presented as a *fait accompli*.

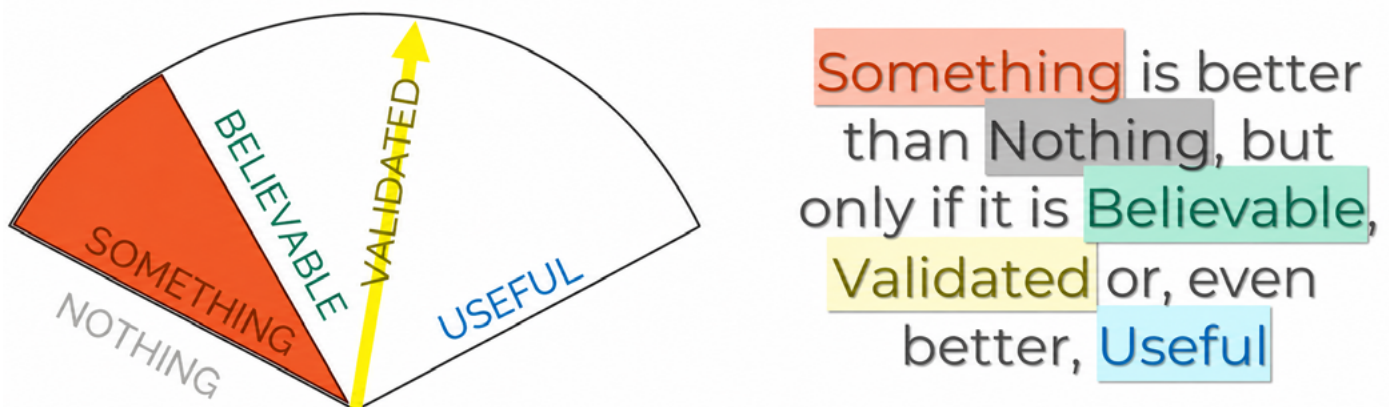
The second category might be characterized as “dude, just trust me” -- figures accompanied by a plausible-sounding narrative explanation but no auditable chain of evidence from source data to final metric. A publisher may claim that their audience figures come from “a sophisticated multi-layered model leveraging proprietary datasets,” a phrase that sounds professional but reveals nothing about what was measured, how it was measured, or whether the measurement was validated.

In both cases, the buyer is asked to accept the number on trust rather than on evidence. A universal metric for OOH must build a long reputation of credibility through openness, coherence, verifiability, and independent auditability. The transparency expected of OOH data should be no less than what is expected of any financial reporting: the ability to trace a reported figure back to its source, understand the transformations applied, and verify that the methodology was followed consistently.

The standard addresses opacity through the Confidential Disclosure of Method requirement. Every adherent must document their data sources, transformation logic, algorithms, and assumptions in a standardized template that functions as a sworn statement. This disclosure becomes the binding terms and conditions for all reported metrics, referenced in invoices and campaign reports. The underlying detection technology and proprietary algorithms remain protected as trade secrets, and are shared only with customers and partners on a need-to-know basis, with obligations to maintain their confidentiality and integrity.

### 2.1.5 QUALITY CONUNDRUM

In the absence of a recognized quality standard, publishers are left to produce audience figures using an informal hierarchy of confidence. This hierarchy can be described as a spectrum of increasing rigor.



At the lowest level is the baseline of producing “something” rather than “nothing.” Any audience figure, however derived, is considered preferable to having no data at all. Above this sits the “believable” level, where the publisher can provide a coherent explanation of how the figure was derived – a narrative that sounds logical even if it cannot be independently verified. Above that is the “validated” level, where an independent entity has scrutinized and validated the methodology through an audit or accreditation process. At the highest level is the “useful” level -- data that produces reliable, repeatable results when evaluated against actual campaign outcomes and algorithmic performance.

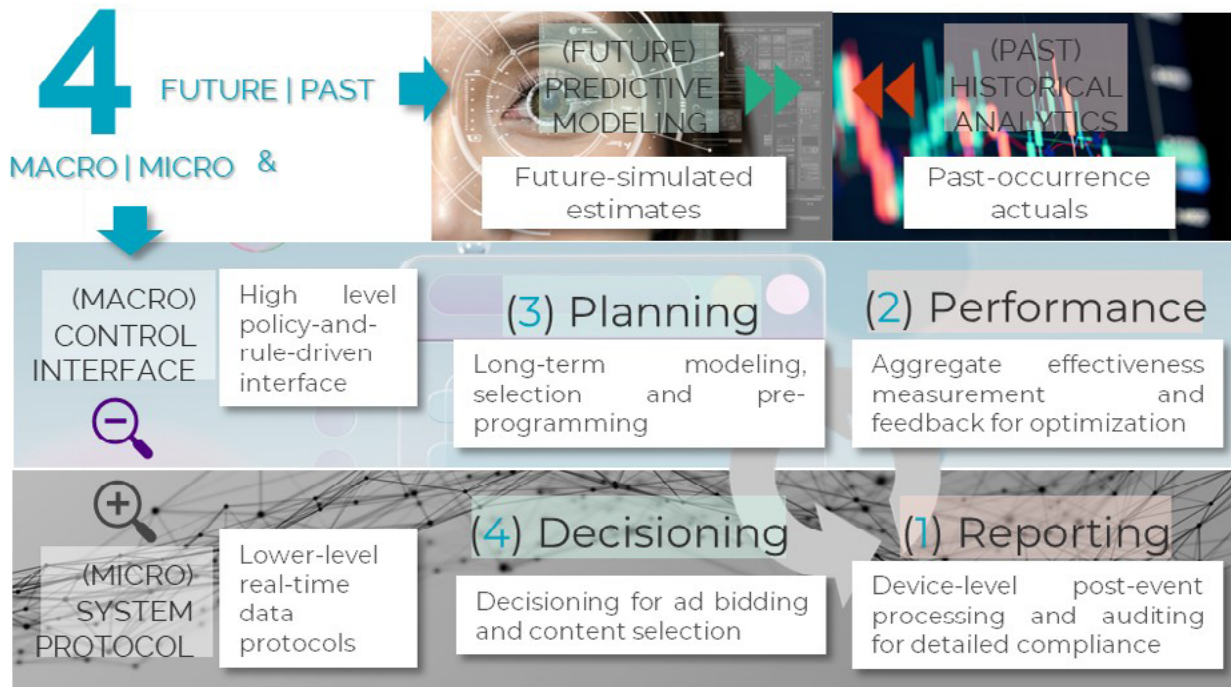
Something is better than nothing, but only if it is believable, validated, or, ideally, useful. Currently, much of OOH’s audience data sits at the “something” level -- present but not scrutinized -- which does not withstand examination by sophisticated buyers. Advertisers want data somewhere between “believable,” backed by a credible methodology, and “useful,” producing consistent performance when integrated into algorithmic buying systems.

There exists no mechanism for suppliers to benchmark their own data against an industry-recognized standard. This absence penalizes publishers who invest in high-fidelity measurement, as they receive no credit for their investment and no competitive differentiation from those who do not. The effect is to depress the perceived value of the entire OOH market. Platforms are also reluctant to implement quality differentiation among their supply sources, as doing so may alienate a subset of their publisher base that cannot meet higher data quality standards.

### 2.1.6 PARTIAL PRODUCTS

A complete OOH data product must support four distinct data-use functions arranged across two axes: time (past versus future) and granularity (macro versus micro). These quadrants describe the operational roles that audience data plays in an advertising ecosystem. A product that satisfies all four is complete. A product that satisfies only some is partial -- sufficient for limited purposes but inadequate for full omnichannel integration.

## QUADRANTS OF DATA



The first axis distinguishes past from future. On the historical analytics side, the data product reports what actually occurred -- documented audience exposures, reach, frequency, and viewability over a completed campaign period. This is the reporting function: post-campaign measurement that confirms delivery against contracted obligations. On the predictive modeling side, the data product estimates what will

occur -- audience projections used for campaign planning, forecasting, pricing, and pre-campaign valuation. This is the planning function: forward-looking estimates that guide buying decisions before a single impression is delivered. A complete data product possesses both properties: a sufficient history of actuals to support statistical modeling, and models capable of estimating future performance with quantified confidence. The historical record trains the model; the model projects the future.

The second axis distinguishes macro from micro. The control interface operates at the policy and rule level -- the parameters that govern campaign scheduling, audience targeting, frequency capping, and content selection. These are aggregate-level constructs: reach goals, demographic segments, daypart weights, and budget allocations. The system protocol operates at the atomic level -- individual sensor detections, ad exposure events, session records, and transformation steps that provide the raw material from which macro-level aggregates are derived. A data product grounded in fine-grained system protocols, with a detailed audit trail and the resulting capability for device-level compliance verification, is inherently more complete than one derived only from aggregate sums. Aggregate data without an atomic audit trail cannot be independently verified.

Many current OOH data products are partial. A product with strong historical analytics but no predictive modeling capability cannot support planning workflows. A product with coarse macro-level aggregates but no micro-level audit trail cannot support compliance verification or independent audit. A product that reports only past performance without the granularity required for decisioning cannot feed algorithmic optimization. The standard specifies minimum requirements across all four quadrants, ensuring that adherent data products are complete rather than partial and can serve the full range of functions that programmatic and traditional buyers require.

## 2.2 AD CURRENCIES

Advertising operates on a hierarchy of currencies -- metrics of account that serve as the basis for buying decisions, performance evaluation, and financial settlement. These currencies are organized into two levels: lower-level currencies that measure the mechanics of ad delivery and audience exposure, and higher-level currencies that measure audience action in response to the advertisement.

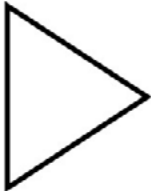



The relationship between these levels is not merely categorical -- it is structural, like a ladder. Each higher currency depends on the ones below it. An advertiser cannot measure clicks without first delivering impressions. They cannot measure engagement without first capturing attention. They cannot measure sales without first establishing exposure and identity. Each step up the ladder requires a more sophisticated meas-

urement infrastructure, but each step also increases the commercial value of the inventory for the media owner and the spend effectiveness for the brand advertiser.

This standard focuses on the lower-level currencies -- the foundation of the ladder -- because these are the currencies that OOH is structurally positioned to produce with integrity. Once OOH can reliably deliver and prove the lower levels, the path to higher-level attribution becomes achievable at least statistically.

### 2.2.1 LOWER-LEVEL CURRENCIES

Lower-level currencies measure what the medium delivers: the fact of ad delivery, its quality of presentation, and the audience exposed to it. These are the currencies that OOH can produce reliably with appropriate measurement infrastructure.

<p><b>CPM</b> POP</p>  <p>Exposure</p>	<p><b>VCPM</b> LTS</p>  <p>Viewability</p>	<p><b>CPCV</b> CPV</p>  <p>Attention</p>	<p><b>CPR</b> GRP</p>  <p>Identity</p>
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The currencies listed below map to a chain of increasing specificity, from the simple fact of delivery through to the identification of individual audience members:

**Cost per Mille (CPM/POP):** Cost per thousand ad units delivered. An impression is counted each time an ad creative is rendered on a functioning display under contract-ed conditions. This is the base currency of digital advertising, pricing inventory by volume of delivery.

**Viewable Cost per Mille (VCPM):** Cost per thousand impressions delivered at a quality threshold sufficient for the content to be potentially perceived by a human observer. Viewability requires that a minimum percentage of the ad surface be unobstructed and within the audience’s field of view for a minimum duration. VCPM prices inventory not by delivery alone, but by the quality of that delivery.

**Cost per Reach (CPR/GRP):** Cost per unique individual reached over a campaign period. Reach counts each person only once, regardless of how many times they were exposed, providing a measure of campaign breadth rather than volume. An older broadcast method of measuring reach is called gross rating point (GRP) which means one percent of the target population reached one time.



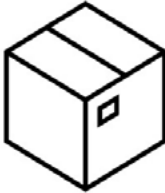
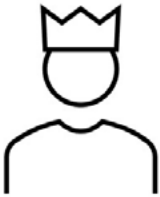

**Cost per Complete View (CPCV):** Cost per individual ad exposure that ran to completion under viewable conditions. For static images, this means the creative remained on screen for the full contracted display duration. For video-capable DOOH surfaces, it means the creative ran from start to finish while meeting viewability requirements. This currency prices inventory by the quality of the complete delivery, not by the thousand as in CPM, which increases its unit value by approximately an order of magnitude for the same underlying ad play.

The progression from CPM to CPV illustrates the ladder principle. The same ad play can be reported as a viewable impression priced per thousand (VCPM), or as a complete view priced per individual view (CPCV), depending on the quality of measurement infrastructure and the rigor of the publisher's methodology. The higher the rung on the ladder, the greater the commercial value of the inventory for the media owner, and the greater the spend effectiveness for the advertiser who can verify that value.

### 2.2.2 HIGHER-LEVEL CURRENCIES

Higher-level currencies measure what the audience does in response to the advertisement. Much of digital advertising's commercial success over the past two decades can be attributed to its ability to produce these currencies at scale. Platforms that can demonstrate clicks, installs, and sales capture a disproportionate share of advertiser budgets because they close the attribution loop -- they prove not just that an ad was seen, but that it produced a measurable outcome.

The consumer journey, however, does not live exclusively in the digital realm. The digital funnel -- impression, click, conversion -- has a physical twin: exposure, attention, footfall, transaction. A highway billboard directing a driver to a restaurant at the next exit drives sales through the physical funnel. A transit screen with a QR code bridges the physical and digital funnels in a single journey. DOOH has the ability to produce higher-level currencies through the physical funnel in much the same way that digital channels produce them through the digital funnel. Where digital channels prove action through server-side events, DOOH can prove it through physical presence, measured footfall, and real-world transaction attribution.

<p><b>CPE</b></p>  <p>Engagement</p>	<p><b>CPC</b></p>  <p>Click</p>	<p><b>CPI</b></p>  <p>Install</p>	<p><b>CPA</b></p>  <p>Acquisition</p>	<p><b>CPS</b></p>  <p>Sales</p>
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**Cost per Engagement (CPE):** Cost per measurable audience interaction with the advertised content. Engagement includes actions such as voluntary prolongation of viewing time, physical interaction with interactive displays, social media activity triggered by the ad content, or scanning of QR codes. Engagement measures active response rather than passive exposure.

**Cost per Click (CPC):** Cost per click-through action initiated by the audience in direct response to the advertisement. In DOOH contexts, clicks may be recorded through QR code scans, NFC taps on interactive surfaces, or follow-on activity on companion digital channels that can be attributed to OOH exposure through time-and-location matching.

**Cost per Install (CPI):** Cost per mobile application installation that can be attributed to the advertising campaign. This currency is particularly relevant for app-driven retail, transit, and entertainment placements where the campaign objective is to drive application adoption among passersby.

**Cost per Acquisition (CPA):** Cost per completed target action or customer acquisition event attributable to the campaign. Acquisition encompasses any defined conversion event -- account registration, newsletter signup, store visit, or product trial -- that represents measurable progress along the advertiser’s funnel. In the physical funnel, a store visit driven by proximity-based OOH messaging is itself an acquisition event of measurable commercial value.

**Cost per Sale (CPS):** Cost per completed commercial transaction that can be attributed to exposure to the advertising campaign. In the physical funnel, this attribution takes forms that digital channels cannot replicate: a consumer who sees a highway billboard reading “McDonald’s Next Exit -- 2 Kilometers” and subsequently pulls off the highway to purchase. These are campaigns that are bought, proven, and renewed

for years or even decades because their effectiveness is self-evident and continuously observable. The physical funnel makes sales attribution tangible in ways that digital attribution can only simulate.

The dependency between lower and higher currencies is the central insight of the ladder. An advertiser cannot measure sales (CPS) without first confirming that the ad was viewed (CPV). They cannot measure engagement (CPE) without first confirming that the audience was present (LTS). They cannot measure installs (CPI) without first confirming that the creative was delivered (POP). Each lower currency is the prerequisite for the one above it.

OOH's opportunity is to develop higher-level measurement capabilities that are native to the physical funnel, complementing the digital funnels that buyers already trust. A verified record of delivery and audience presence is not the entire attribution chain, but it is the starting point from which physical action can be measured. When a consumer sees a directional OOH message and follows it to a point of sale, the OOH medium has produced a higher-level currency in exactly the way digital channels do -- the mechanism is simply physical rather than digital. The standard ensures that these physical-funnel outcomes are measured consistently, reported transparently, and integrated into the same evaluation frameworks that advertisers already use for digital attribution.

## 2.3 GLOBAL AD MARKET

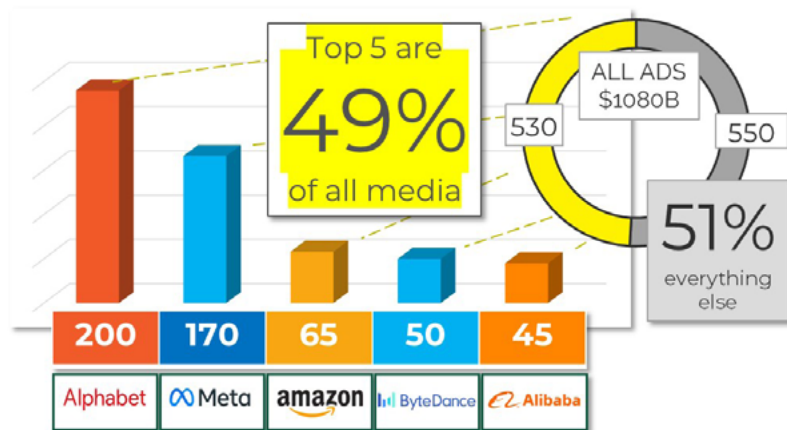
The commercial case for standard adoption must be understood in the context of a fundamental shift in the advertising industry: data is no longer a supporting function of media. It is a market in its own right, and it now sits at the top of the funnel.

Advertisers buy data first to know what media to buy. Algorithms increasingly make media investment decisions automatically, allocating budgets across channels based on data quality signals alone. For media inventory to be considered in this process, it must be discoverable and transactable through a data proxy -- a standardized, algorithm-readable representation of what the concrete advertisement actually delivers. The old truism says that half of all advertising is wasted and no one knows which half. Data is the mechanism that identifies which half, and controls it.

The entities that dominate modern advertising understand this deeply. The Big Five platforms, the dominant programmatic networks, and the leading demand-side systems have all built their businesses on the principle that data and media are not separate purchases. They are a single integrated product, where data drives the investment decision and media delivers the outcome.

### 2.3.1 THE BIG FIVE DOMINATE ADVERTISING

Five digital platforms -- the combination of major search, social, and e-commerce entities -- account for approximately 49 percent of all global advertising spend as of 2025, capturing roughly \$530 billion of an estimated \$1.08 trillion market.



### Why?

They sell a **Data** product which includes **Media** like a **Coke** in a **Happy Meal**



Search



Social



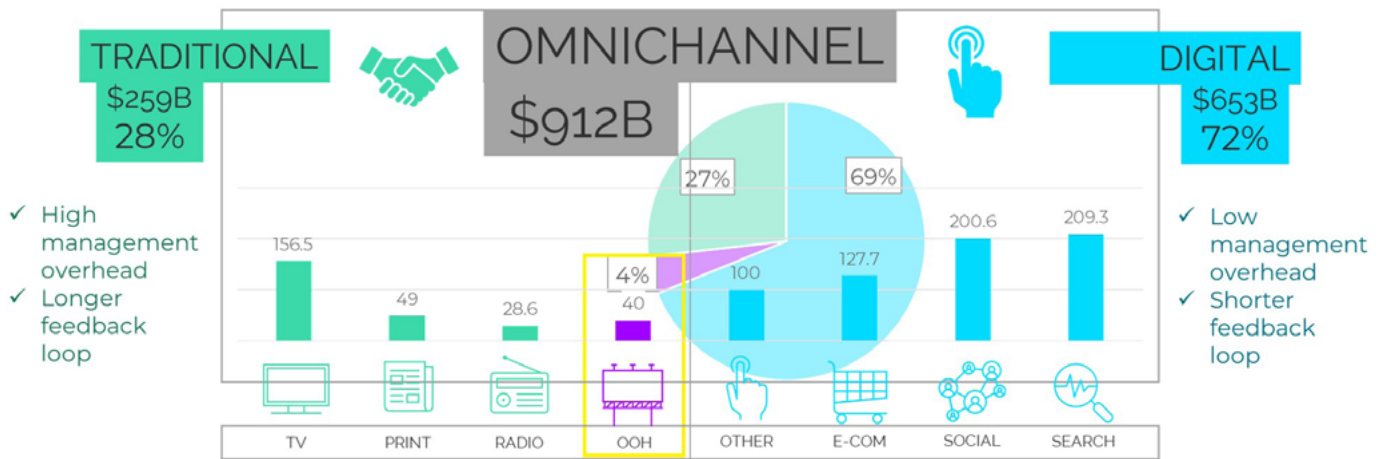
E-Com

Their dominance is not achieved through superior media placement alone. What the Big Five sell is not ad space. They sell a data product that wraps completely around the media transaction. The advertiser does not buy an ad slot. They buy a verified outcome -- confirmed by server-side event tracking, attributed through identity resolution, and optimized continuously through algorithmic feedback. The media delivery is the mechanism. The data product is what is purchased.

Every one of these platforms trades in higher-level currencies -- clicks, installs, acquisitions, sales -- which are fundamentally data+media products. The advertiser's budget flows toward the platform that can prove its outcomes with the most precision. Media placement is evaluated not as a standalone asset but as one component of a data-verified supply chain.

### 2.3.2 DIGITAL DOMINATES THE OMNICHANNEL

Digital media accounts for approximately 72 percent of total global omnichannel advertising spend -- roughly \$653 billion of \$912 billion in 2025. Traditional media -- television, print, radio, and OOH combined -- accounts for the remaining 28 percent, or approximately \$259 billion.

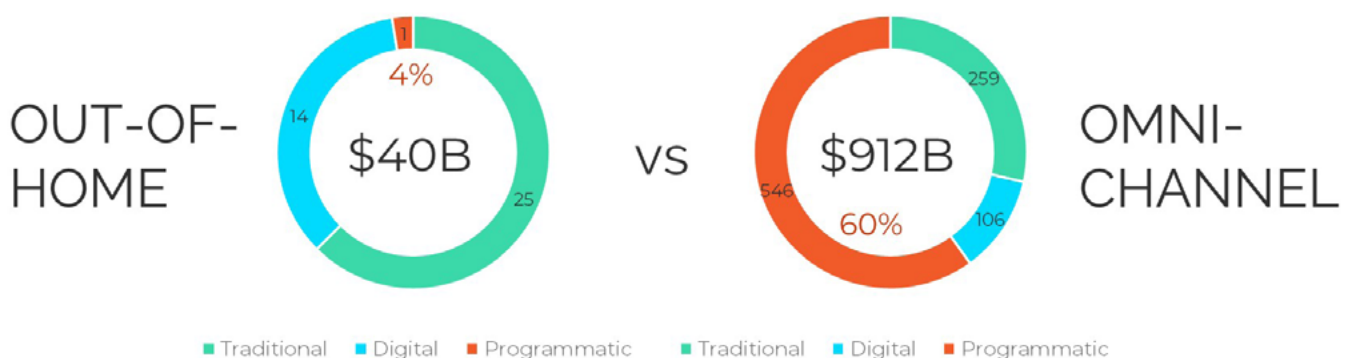


Within the traditional segment, television remains the largest single channel at approximately \$156.5 billion. OOH represents approximately \$40 billion -- smaller than television by a factor of four, but comparable to radio and print. Within the digital segment, search leads at approximately \$209.3 billion, social at approximately \$200.6 billion, and e-commerce at approximately \$127.7 billion. Display media, the category most comparable to OOH in format, accounts for approximately \$100 billion.

The channels that lead are those that integrated data and media into a unified offering. Data serves as the top-of-funnel investment: advertisers evaluate and select channels based on the quality, depth, and verifiability of the data signal. Media execution follows. Channels that supply rich data proxy representations of their inventory capture allocation through automated systems. Those that do not must sell through manual processes that are increasingly marginalized.

### 2.3.3 PROGRAMMATIC IS THE EXECUTION ENGINE

Programmatic advertising -- the automated buying and selling of media through policies, data, and algorithms -- accounts for approximately 60 percent of all digital spend globally, representing roughly \$546 billion of the \$912 billion omnichannel total. Traditional direct-sold digital accounts for approximately \$106 billion.

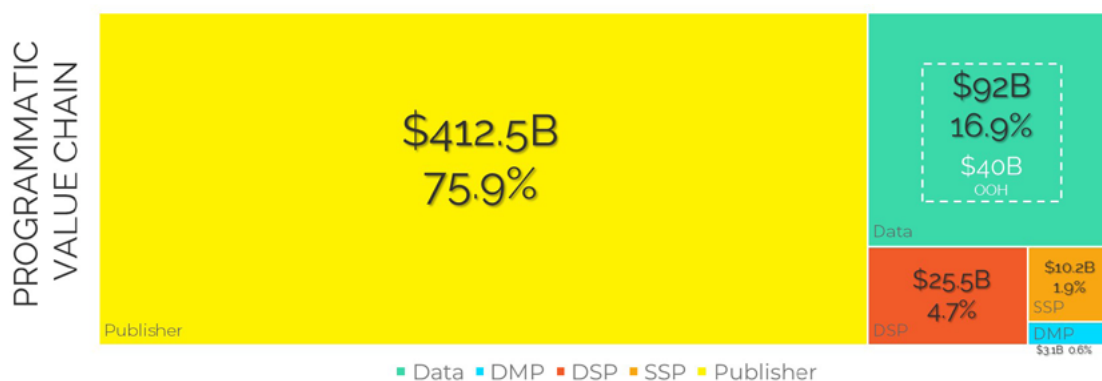


Programmatic is the mechanism that connects data to media at scale. It does not discriminate by medium. It discriminates by data quality. Inventory that provides standardized, verified, and algorithmically interpretable data signals receives increasing budget allocation through automated decisioning. Inventory that cannot provide these signals is deprioritized regardless of its inherent reach or creative quality.

This is why programmatic adoption in OOH matters. It is not about the mechanics of real-time bidding. It is about the fact that programmatic trading enforces a data quality standard through market forces. In a world where algorithms decide media investment, discoverability becomes the prerequisite for participation.

2.3.4 THE AD DATA INDUSTRY IS TWICE THE SIZE OF OOH

This is the most telling comparison in the modern advertising landscape. Advertising data -- the market encompassing measurement, attribution, audience modeling, identity resolution, and optimization -- is a decade-old industry valued at approximately \$92 billion annually. OOH advertising as a medium is over a century old, and the global OOH market is approximately \$40 billion. The data industry is already twice the size of the medium.

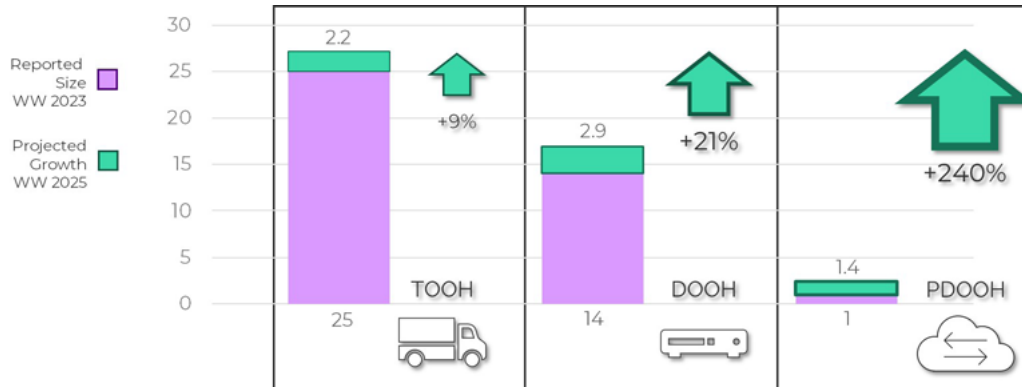


Within the programmatic value chain, ad data is the largest non-media expense at 16.9 percent of non-media spend. This market exceeds the DSP technology market at \$25.5 billion by more than three times. It exceeds the SSP technology market at \$10.2 billion by nine times. Media spend accounts for \$412.5 billion, or 75.9 percent of total programmatic value -- but the growth, the margin, and the strategic control all reside in data.

What this means for OOH is clear. The most valuable component of the modern advertising transaction is not the physical placement. It is the data that proves what that placement delivers. A medium that does not produce its own data at a competitive standard is participating in only half of the transaction.

### 2.3.5 PROGRAMMATIC OOH IS GROWING BECAUSE DATA QUALITY IS IMPROVING

Programmatic DOOH is the fastest-growing segment of the OOH market, with year-over-year projections indicating growth rates of approximately 240 percent, compared to 9 percent for traditional OOH and 21 percent for non-programmatic digital OOH.



This growth is driven by publishers and data providers who have begun to treat measurement as a first-class product rather than a supplementary service. As their data quality improves, their inventory becomes more visible to programmatic systems, and algorithmic budget allocation follows. The standard accelerates this trajectory by providing a framework that any publisher can adopt, making their data product algorithmically compatible with programmatic systems regardless of the underlying measurement methodology.

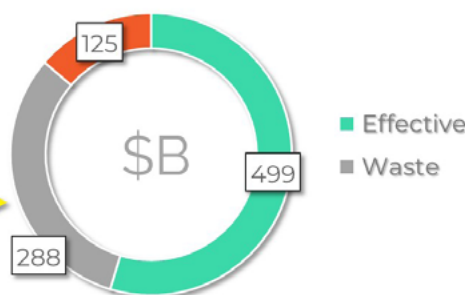
### 2.3.6 AD WASTE AND THE ROLE OF DATA

Ad waste refers to the portion of advertising spend that fails to reach the intended audience or otherwise achieve the desired marketing objective. Industry analysis estimates that approximately 46 percent of global advertising spend is wasted -- nearly \$288 billion of a roughly \$612 billion addressable market, with an additional \$125 billion lost to fraudulent activity.

“Half of my advertising is wasted I just don’t know which half”

JOHN WANAMAKER USA      LORD LEVERHULME UK

It is actually 46%



#### TYPES OF WASTE

- ✓ Wrong Placement
- ✓ Wrong Message
- ✓ Known Waste
- ✓ Fractional Waste
- ✓ Fraud
- ✓ Abuse

Sources: GROUPM, STATISTICA, JUNIPER RESEARCH, ANURA, LUMEN RESEARCH, THE DRUM

The types of waste include wrong placement, wrong message, known waste, fractional waste, fraud, and abuse. The truism, attributed to both John Wanamaker and Lord Leverhulme more than a century ago, remains quantitatively accurate today: “Half of my advertising is wasted, I just don’t know which half.”

Data is the mechanism that controls this waste. Verification, fraud detection, viewability measurement, and attribution are all waste-reduction functions. They allow advertisers to identify which portion of their spend is effective and which portion is not, and to reallocate accordingly. Channels that supply verified, standardized data enable waste control. Channels that do not force advertisers to accept waste as an unknowable cost of doing business.

OOH’s physical verifiability positions it uniquely to address waste. A screen in a public space can be independently confirmed. A driver who follows a “Next Exit” sign can be observed. A consumer who walks into a store after seeing a transit screen leaves a traceable physical signal. But to participate in waste control at the algorithmic level, OOH must express its verifiability in the same currencies and formats that programmatic systems already use. The physical reality of OOH is an advantage, but it is an advantage that must be translated into data to be actionable at scale.

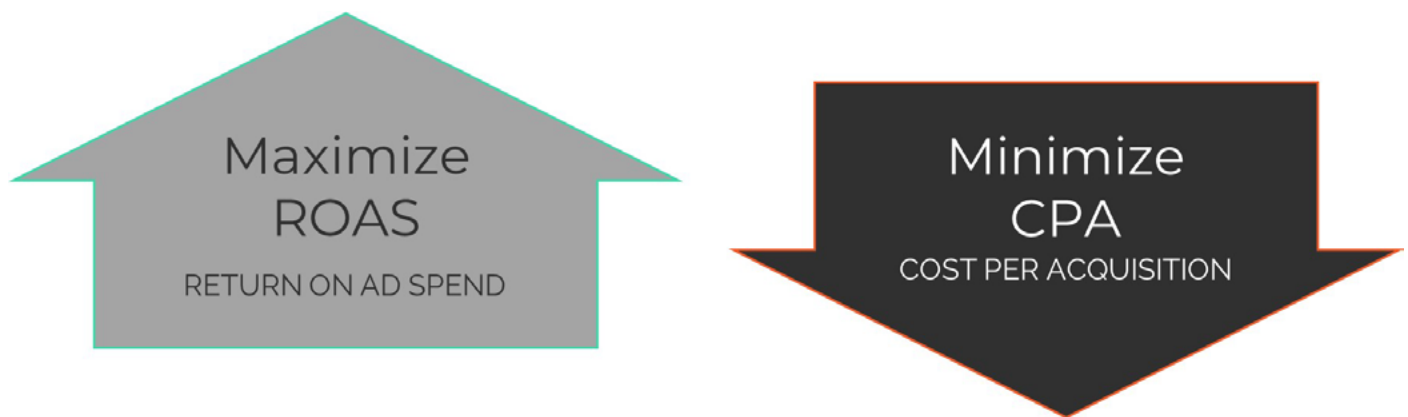
## 2.4 DOOH DATA PRODUCT

The market analysis presented in this section leads to a clear conclusion: the programmatic advertising ecosystem has established a well-defined path for media participation, and that path runs through data. Advertisers buy data first to know what media to buy. Algorithms increasingly make media investment decisions automatically, allocating budgets across channels based on standardized data signals. For any medium to participate fully, its inventory must be described, measured, disclosed, and reported in forms that these systems can recognize and evaluate.

This section prescribes a playbook for DOOH stakeholders -- publishers, measurement providers, and data companies -- on how to structure their measurement outputs so that DOOH inventory can enter the advertising data market and compete for programmatic investment alongside all other digital channels.

### 2.4.1 WINNING IN THE ALGORITHM

Programmatic buying platforms evaluate inventory through reinforcement learning algorithms that assess performance across channels and redistribute budgets based on observed outcomes. These systems generally optimize for return on ad spend and cost per acquisition, comparing available inventory against historical performance data and campaign objectives.



To be considered in this process, media inventory must supply measurement outputs in structured formats that algorithmic systems can interpret and compare. The metrics standard addresses this by defining a common framework for DOOH data that integrates with the evaluation workflows already established across the programmatic ecosystem. When DOOH measurement conforms to this framework, it becomes comparable with other channels within automated allocation systems.

### 2.4.2 THE VIRTUAL PRODUCT

In programmatic buying, selection algorithms evaluate a large pool of potential inventory before making bid decisions. This pool constitutes the consideration set. For DOOH to be included in that set, its measurement data must be structured as a “Virtual Product” -- a standardized representation of media inventory that programmatic systems can parse, evaluate, and compare alongside signals from other digital channels.

## VIRTUAL PRODUCT



Standard Taxonomies



Standard Processes



Standard Qualities



Standard Currencies

The metrics standard defines four structural elements that transform raw DOOH measurement into a Virtual Product:

**Standard taxonomies** provide the classification vocabulary that allows algorithms to understand what the inventory is. Venues, placements, audience segments, content categories, and privacy classifications are mapped to established frameworks from IAB Tech Lab and OpenOOH, ensuring that programmatic platforms recognize DOOH as a defined media category.

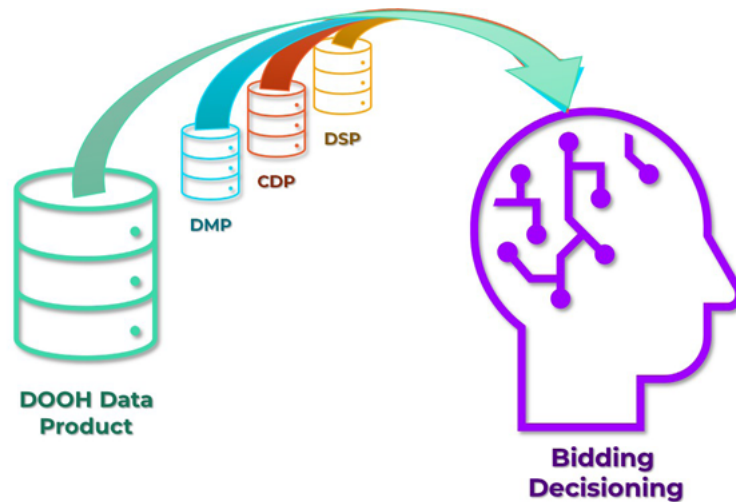
**Standard processes** describe how inventory data is produced, from source detection through sanitization, conversion, adaptation, and adjustment. A defined production pipeline allows algorithmic systems to assess the structure and provenance of each impression signal, supporting evaluation regardless of the specific detection technology employed by the publisher.

**Standard qualities** establish quality dimensions -- recency, granularity, coverage, and density - that characterize the depth and reliability of the inventory data. These dimensions allow media selection algorithms to differentiate between precise, high-resolution signals and broader estimations within the consideration set.

**Standard currencies** translate inventory availability and audience presence into the commercial metrics that algorithms use to evaluate campaign fitness. By expressing DOOH inventory in recognized currencies such as CPM, VCPM, and reach, the standard ensures that the Virtual Product is priced and valued using the same commercial language as inventory from other channels.

### 2.4.3 DISCOVERABILITY AND DEMAND CREATION

Discoverability refers to the ability for DOOH inventory to be found and selected by media algorithms during the programmatic buying process. A demand-side platform executing a campaign will query its available inventory pool using targeting criteria such as audience demographics, geographic market, venue type, and content category. If DOOH inventory is not tagged and classified according to the taxonomies that these systems use, it will not appear in the consideration results -- not because it is unsuitable for the campaign, but because it was never discoverable within the system.



Standard taxonomies serve this discoverability function directly. When a DOOH publisher tags their inventory with IAB-aligned venue classifications, audience segment labels, and standardized currency outputs, their media becomes visible to the full range of programmatic campaigns that target those criteria. A campaign seeking retail audiences in urban markets will discover DOOH inventory classified with matching tags on the same terms as display or video inventory with the same classifications.

This initial discoverability step -- having inventory properly tagged and qualified for consideration -- is the prerequisite for participation in algorithmic buying. When inventory is discovered, bid on, and shown to produce results, reinforcement learning increases the confidence level of that inventory type within the system and directs more budget toward similar placements in future auctions. The metrics standard supports publishers in achieving this discovery by providing the taxonomy mappings, quality dimensions, and currency definitions required to structure measurement outputs in a form that programmatic platforms can find, evaluate, and incorporate into their buying decisions.

### 3. STANDARD



This module contains the technical specification of the ABOOH DOOH Metrics Standard. It provides the definitive definitions, structural architecture, and quality requirements that govern how DOOH audience measurement is produced, reported, and verified.

The standard operates independently of any specific measurement technology or data source. Rather than prescribing particular sensors, algorithms, or vendors, it defines the framework within which any DOOH measurement system can produce standardized, comparable outputs. Publishers retain full freedom to select the detection methods and data providers that best serve their operational requirements, while the standard ensures that all resulting metrics are structured identically and expressed in a common vocabulary recognized across the omnichannel advertising ecosystem.

#### 3.1 CHARTER

The Charter establishes the mission, vision, and values that govern the design and evolution of the standard. Every definition, threshold, and structural requirement that follows is traceable back to these foundational principles. Where ambiguity exists in any subsequent specification, the Charter provides the interpretive framework for resolving it.

##### 3.1.1 MISSION

The mission describes what the standard sets out to achieve.

UNITE



,

HARMONIZE



&

PRODUCTIZE



### 3.1.1.1 Unite

Bring the Brazilian OOH market together under a single, universal data product governed by a common set of terms, definitions, conditions, rules, formulas, algorithms, and metrics. Every entity that produces or consumes OOH audience data -- publishers, advertisers, agencies, measurement providers, and platforms -- benefits from a shared vocabulary that eliminates ambiguity and enables direct comparison.

### 3.1.1.2 Harmonize

Reconcile the diverse array of OOH formats, maturities, complexities, venue types, and display placements into a cohesive and coherent standard data production framework. The standard does not eliminate this diversity -- it provides a harmonization layer that sits above the detection technology and below the reported metric, ensuring that outputs from different methodologies remain structurally comparable.

### 3.1.1.3 Productize

Transform the standard into a practical, promotable product that can be positioned to omnichannel advertisers as a competitive starting point for campaign planning. The standard integrates seamlessly with the platforms advertisers already use -- demand-side platforms, customer data platforms, and data management platforms -- ensuring that DOOH inventory is discoverable, comparable, and actionable without custom integration or format translation.

## 3.1.2 VISION

The vision describes the characteristics the standard is designed to exhibit.

LIGHTWEIGHT



COMPATIBLE



&

COMPETITIVE



### 3.1.2.1 Lightweight

Adoption and compliance should be as close to effortless and costless as possible. The standard imposes minimal operational burden on adherents. No new data collection infrastructure is required. Existing measurement systems are mapped to the standard's terminology and output requirements. The Confidential Disclosure of Method template functions as a standardized affidavit that any organization can complete without legal complexity or external consultancy.

### 3.1.2.2 Compatible

The framework is as universal as possible, designed to work with any DOOH measurement technology, any data supplier, any venue type, and any geographic context. It locks nothing out. Publishers using computer vision, Wi-Fi probing, Bluetooth detection, mobile carrier data, GPS aggregation, or any combination thereof can all comply by mapping their outputs to the standard's structural requirements. The framework interoperates with international standards frameworks from IAB, MRC, and WOO, ensuring alignment with global practice.

### 3.1.2.3 Competitive

The standard positions DOOH as a premium medium within the omnichannel ecosystem and an ideal starting point for any campaign. By producing accurate, standardized, and algorithmically compatible audience data, DOOH inventory carries a verifiable quality that allows it to compete on equal footing with established digital channels while offering something they cannot: physical verifiability that anyone can witness and confirm.

### 3.1.3 VALUES

The values define the principles by which the standard is constructed and maintained.

**Trustworthiness** is the paramount objective of the standard. Trust requires a long time to earn and can be lost quickly. Every specification, threshold, and compliance requirement is designed to earn and maintain the trust of all parties who rely on reported metrics -- advertisers who allocate budget, agencies who plan campaigns, platforms who execute buys, and publishers who deliver inventory.

**Unambiguity** requires that no detail be left to chance or interpretation where ambiguity can be eliminated. Definitions are precise. Thresholds are numerical. Conditions are testable. The standard is designed so that two parties reading the same specification arrive at the same understanding without external clarification.

**Fairness** requires that the terms and conditions of the standard be balanced across all parties -- seller, buyer, platform, and provider. Each side can call balls and strikes independently. The standard does not give any party unilateral authority to define correctness; it provides a shared framework within which all parties can verify outcomes for themselves.

**Compendiousness** demands that the standard be both comprehensive and concise simultaneously. It is as complete as necessary to eliminate ambiguity, but no larger. Redundancy and superfluousness are eliminated. The standard is designed to be read in full, not selectively referenced.

**Reproducibility** means that all measurement results can be independently verified by an outside party with access to the source data and the disclosed methodology. Transparency alone is not sufficient -- a third party must be able to follow the same transformation steps and arrive at the same result. Reproducibility eliminates black boxes while protecting proprietary algorithms through the Confidential Disclosure of Method framework.

**Confidentiality** acknowledges that measurement methodology, detection technologies, and algorithmic parameters may represent competitive advantages and trade secrets. The standard protects this information by restricting access to those with a legitimate need to know. Full transparency of process is maintained while proprietary details remain confidential under standard non-disclosure agreements.

**Redressability** ensures that all affected parties have recourse when reported metrics underperform against committed levels. Standardized procedures for investigating discrepancies, calculating make-goods, and resolving disputes are defined within the compliance framework, so that both buyers and sellers operate under clear and predictable remediation rules.

### 3.2 THE STANDARD PRODUCT

The standard defines a data product architecture that produces viewable impressions, likelihood-to-see metrics, visibility-adjusted contacts, adjusted impressions, and net impressions from a unified foundation. All metric variants share the same structural anatomy and are produced through the same transformation pipeline.

#### 3.2.1 THE VIEWABLE IMPRESSION

The impression is the fundamental unit of currency in digital advertising. It requires combining two independent data layers -- advertisement exposure and audience presence -- into a single verifiable event.



An impression is qualified when both conditions are satisfied simultaneously for a minimum duration. An ad exposure without audience presence is a served event with no advertising value. An audience member without an active ad exposure is foot traffic with no campaign attribution. Only the conjunction of the two constitutes a billable, reportable impression.

### 3.2.2 THE IMPRESSION MULTIPLIER

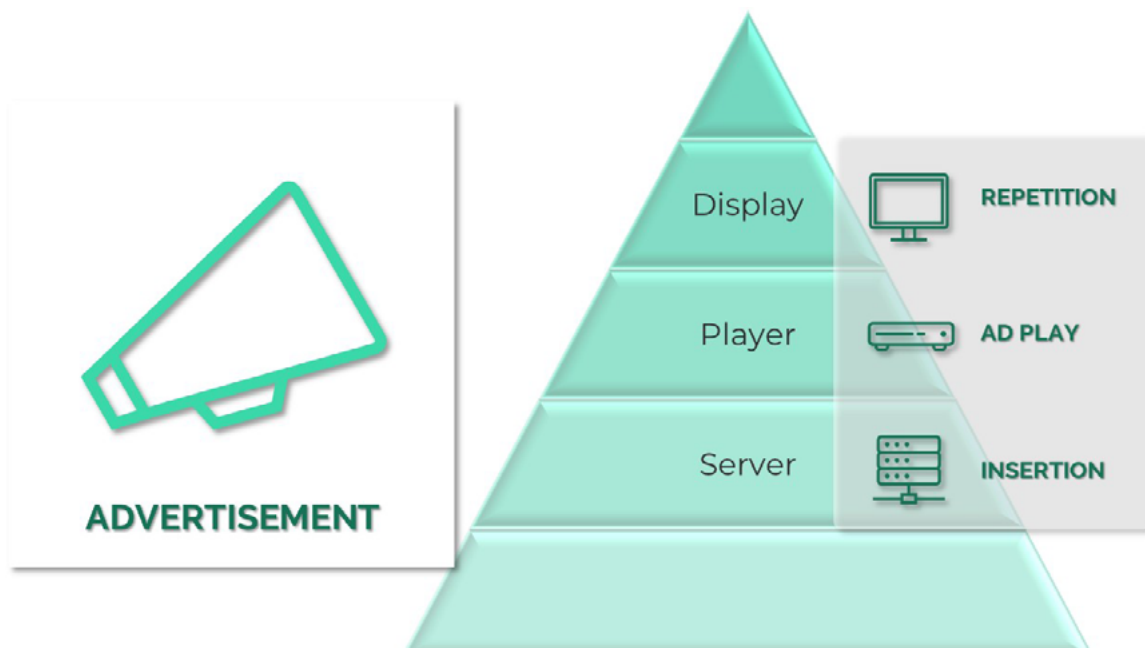
Programmatically, DOOH operates differently from all other digital channels. Where television, desktop, mobile, and connected television each assume an audience of exactly one per ad delivery, DOOH requires an additional data layer -- the impression multiplier -- that quantifies the actual audience size at the time of each ad play.



The impression multiplier is the numerical value that communicates DOOH's scale advantage to the bidding system. A single ad play may be viewed by zero people during an off-peak hour or by hundreds during a commute rush. The impression multiplier is the mechanism that expresses this variability to the automated allocation system.

### 3.2.3 THE ADVERTISEMENT LAYER

The advertisement layer establishes that an ad creative has been correctly rendered, at sufficient quality, on a functioning display. It is verified through a three-part provenance chain from server to screen to verification.



### 3.2.3.1 Insertion

An insertion is the provable delivery of an ad from the ad server to the client media player. It represents the contractual obligation that a specific creative has been transmitted to a specific display unit. Insertions are sometimes referred to as server logs or broadcast logs.

### 3.2.3.2 Ad Play

An ad play is the provable rendering of an insertion on the client media player. It confirms that the creative was actually played by the player software, not merely queued or delivered. An ad play is sometimes referred to as a playlog or proof of play.

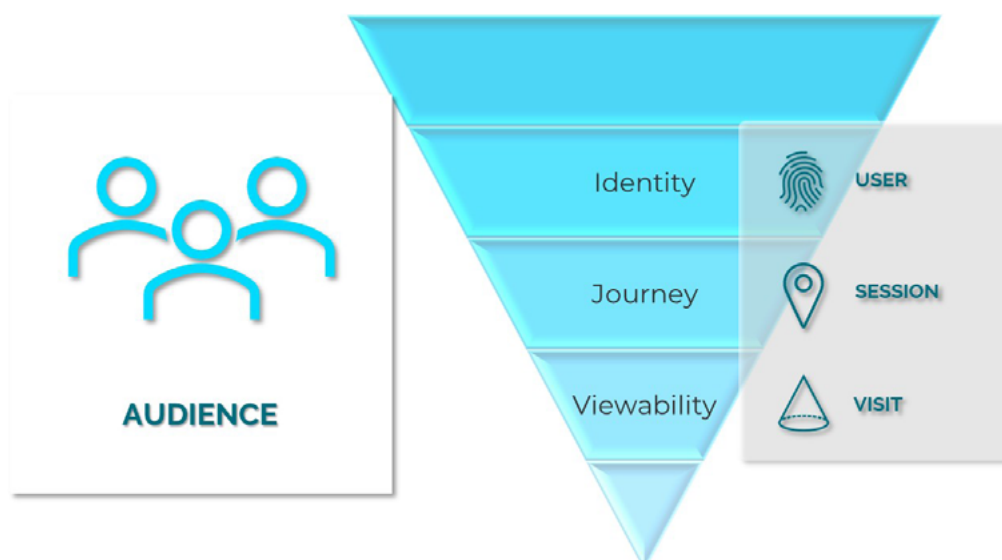
### 3.2.3.3 Repetition

A repetition is the provable delivery of the impression on a functioning display surface. It supports multiple displays and counts one repetition for each mirrored display when a single signal drives multiple screens. A repetition is sometimes referred to as a display log or proof of display.

An ad exposure is considered qualified when the ad is playing correctly as intended -- without video aberrations or dropped frames -- and, simultaneously, the display is powered on and rendering the ad on its physical surface. Exposure qualification does not depend on audience presence. It is a prerequisite condition that must be satisfied independently before any audience measurement can be combined with it.

## 3.2.4 THE AUDIENCE LAYER

The audience layer establishes that a human prospect was within input range relative to the ad medium -- specifically, within a position and orientation from which the ad was viewable. It is verified through individual detection, journey tracking, and visit qualification.



### 3.2.4.1 User

A user is a uniquely identified individual person. This user may be known -- a registered person with associated demographic segments -- or unknown -- an anonymous visitor detected by local sensors. A user has one or more sessions. Users are deduplicated across exposures within a defined time window for reach calculations.

### 3.2.4.2 Session

A session is an individual journey of a user through a location where advertising media is present. A session has zero or more visits and a duration, which is commonly referred to as dwell time. Sessions are bounded by entry into and exit from the measurement zone of the venue or sub-venue.

### 3.2.4.3 Visit

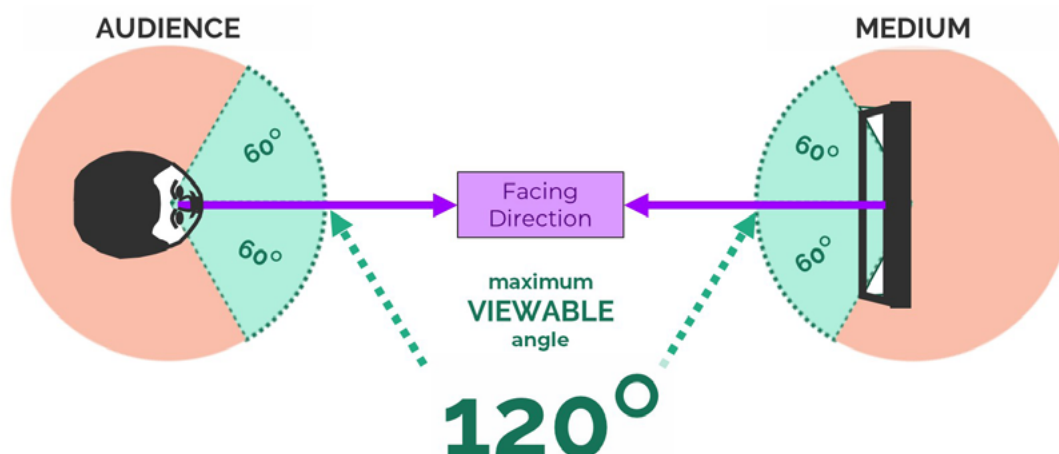
A visit occurs when a user qualifies for viewability to a specific media surface. Visits generate viewable impressions from the ad exposures that occur on that surface during the visit window. A visit is not guaranteed to produce an impression -- it is a precondition that, when combined with a qualified ad exposure during the same time window, qualifies as a reportable impression.

## 3.3 VIEWABILITY

Viewability defines the minimum quality threshold that an ad exposure and audience presence must satisfy to qualify as a valid impression. It establishes the conditions under which an ad is considered receivable by the audience.

### 3.3.1 VIEWABLE ANGLE

The viewable angle defines the horizontal field within which an audience member is considered to have a reasonable opportunity to see the screen. A person cannot see an ad that is behind them. The audience's field of view is approximately 120 degrees wide, centered on their facing direction.



The screen’s viewability angle corresponds to this field of view due to the principle of optical reciprocity. The effective viewable angle for any display is the lesser of 120 degrees and the display technology’s own published viewing angle. A person whose heading falls outside this angle relative to the screen does not qualify as part of the audience for purposes of impression counting.

### 3.3.2 VIEWABLE DISTANCE

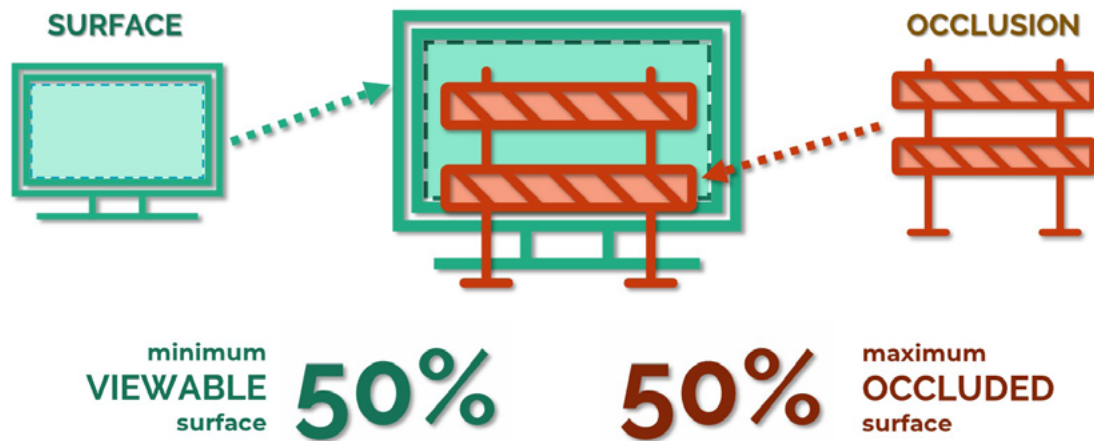
The maximum viewable distance is the furthest point from which a screen’s content can be read with reasonable clarity. A larger screen can be seen from further away than a smaller screen, meaning that the viewable zone scales with display area.



The formula to calculate the viewable distance for a screen is derived from Federal Highway Administration standards for road traffic signage: the maximum viewable distance equals the square root of the display area in square centimeters, multiplied by 23. As a practical shorthand for screens using a 16:9 aspect ratio, the maximum viewable distance in centimeters equals the diagonal screen measurement in centimeters, multiplied by 15. The minimum viewable distance is typically constrained by the audience flow and physical access to the screen; for highway-facing screens, it is constrained by safety and regulatory setbacks.

### 3.3.3 VIEWABLE SURFACE

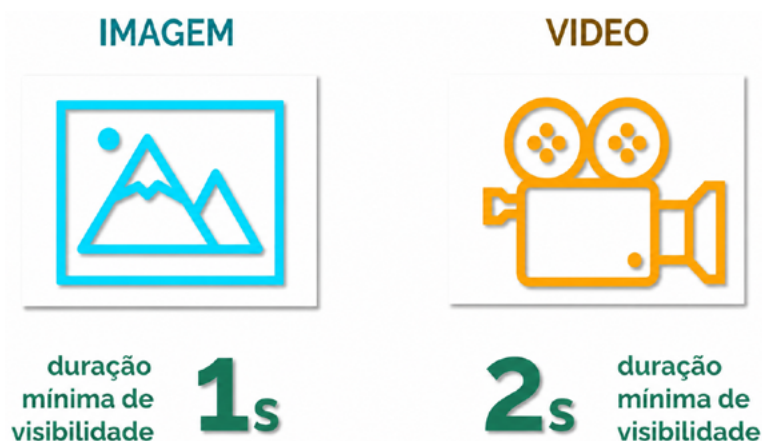
For an impression to qualify, the ad content must be sufficiently unobstructed on the display surface. A minimum of 50 percent of the ad surface must be visible, with a maximum of 50 percent occlusion permitted from obstacles such as pedestrians, vehicles, trees, signage, or structural elements.



Occlusion is evaluated dynamically. Temporary obstructions -- such as a pedestrian passing between the viewer and the screen -- do not permanently disqualify an impression. Rather, they interrupt the viewability clock, which accumulates cumulatively. Only when the ad surface meets the 50 percent visibility threshold at the same time that the audience member meets the viewable angle and distance requirements does the viewability condition contribute toward the minimum duration.

### 3.3.4 VIEWABLE DURATION

The viewable duration is the minimum cumulative time that an audience member must maintain qualified presence within the viewability zone while the ad is exposed on the screen. This threshold differs for image and video content.



For static image or display ads, the minimum cumulative viewable duration is 1 second. For video ads, the minimum cumulative viewable duration is 2 seconds. These thresholds are cumulative, not continuous -- temporary viewability interruptions (such as occlusion by passersby) pause but do not reset the accumulation timer. If the cumulative unoccluded viewable duration reaches the applicable threshold during a single pass through the viewability zone, the impression is qualified.

### 3.3.5 DISPLAY BRIGHTNESS

Display brightness is a viewability prerequisite. The luminance thresholds below are grounded in the brightness evaluation methodology established by Krumina et al. (2021) and are required for an ad to qualify as viewable. All luminance values are expressed in candelas per square metre ( $\text{cd}/\text{m}^2$ ), numerically equivalent to nits. Measurements shall be taken with a calibrated luminance meter on-axis, averaged across a minimum nine-point grid. Luminance uniformity shall be at least 70 percent (ratio of minimum to maximum reading).

The standard defines two brightness tiers based on minimum contrast ratio between display luminance and reflected ambient light. The 2:1 contrast ratio represents the physiological detection floor -- content is perceptible but not reliably legible at advertising distances. The 3:1 contrast ratio is the threshold at which content becomes legible at a glance. Displays meeting the Old Brightness Rules qualify impressions under the standard. Displays meeting the New Brightness Rules additionally satisfy the premium quality designation.

#### 3.3.5.1 Minimum Nighttime Brightness - Static Billboard

Static billboard displays (externally or internally illuminated print media) shall maintain a minimum luminance of  $150 \text{ cd}/\text{m}^2$  during nighttime operation (ambient illuminance below 100 lux). Displays operating below this threshold shall not qualify impressions.

#### 3.3.5.2 Minimum Daytime Brightness - Digital Display

The minimum displayed luminance during daytime operation (ambient illuminance above 10,000 lux) depends on which rule set the display satisfies:

**Old Brightness Rules (2:1 contrast):** Minimum displayed luminance of  $2,500 \text{ cd}/\text{m}^2$ . Peak hardware capability of at least  $3,000 \text{ cd}/\text{m}^2$ . Displays at this tier qualify impressions but do not satisfy the premium quality designation.

**New Brightness Rules (3:1 contrast):** Minimum displayed luminance of  $4,000 \text{ cd}/\text{m}^2$ . Peak hardware capability of at least  $5,000 \text{ cd}/\text{m}^2$ . Displays at this tier satisfy the premium quality designation for brightness.

Displays operating below the  $2,500 \text{ cd}/\text{m}^2$  daytime minimum shall not qualify impressions during the period in which the luminance threshold is not met.

#### 3.3.5.3 Maximum Nighttime Brightness -- Digital Display

Digital DOOH displays operating in nighttime conditions (ambient illuminance below 100 lux) shall not exceed  $800 \text{ cd}/\text{m}^2$  in urban areas or  $600 \text{ cd}/\text{m}^2$  in rural areas. The nighttime minimum for digital displays is  $150 \text{ cd}/\text{m}^2$ .

The operational brightness ranges by tier are:  
Municipal ordinances that impose more stringent maximums take precedence. The

Ambient Condition	Approx. Lux	Min (Old Rules)	Max (Old Rules)	Min (New Rules)	Max (New Rules)
Daylight	10.000+	2.500 cd/m <sup>2</sup>	7.000 cd/m <sup>2</sup>	4.000 cd/m <sup>2</sup>	7.000 cd/m <sup>2</sup>
Overcast	1.000-10.000	1.500 cd/m <sup>2</sup>	5.000 cd/m <sup>2</sup>	2.000 cd/m <sup>2</sup>	5.000 cd/m <sup>2</sup>
Twilight/ Dawn	100-1.000	500 cd/m <sup>2</sup>	2.500 cd/m <sup>2</sup>	500 cd/m <sup>2</sup>	2.500 cd/m <sup>2</sup>
Night, urban	< 100	150 cd/m <sup>2</sup>	800 cd/m <sup>2</sup>	150 cd/m <sup>2</sup>	800 cd/m <sup>2</sup>
Night, rural	< 100	150 cd/m <sup>2</sup>	600 cd/m	150 cd/m <sup>2</sup>	600 cd/m <sup>2</sup>

minimums defined here remain applicable regardless of local ordinance.

### 3.4 DISCOVERABILITY

Discoverability ensures that DOOH inventory is described, classified, and structured in a form that allows programmatic buying platforms to find, evaluate, and select it alongside inventory from other digital channels.

#### 3.4.1 TAXONOMIES

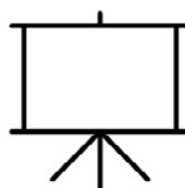
For an impression to qualify, the ad content must be sufficiently unobstructed on the display surface. A minimum of 50 percent of the ad surface must be visible, with a maximum of 50 percent occlusion permitted from obstacles such as pedestrians, vehicles, trees, signage, or structural elements.



Ad Product



Audience



Content



Privacy

The standard adopts the taxonomy frameworks defined by IAB Tech Lab, which cover ad product categories, audience segment classifications, content category taxonomies, and privacy and consent categories. These are applied to DOOH in the same manner as they are applied to display, video, and other digital channels.

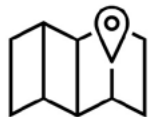


### Ambiente (Venue)

For venue classification, the standard adopts the OpenOOH Venue Taxonomy, which provides a standardized vocabulary for categorizing DOOH placements by type, sub-type, and contextual attributes. This taxonomy maps physical locations and display characteristics into programmatic targeting parameters. The OpenOOH and IAB taxonomies are complementary -- OpenOOH describes where the screen is, IAB describes what the screen serves.

### 3.4.2 PLACEMENT

Every DOOH placement in the standard is described by a unified set of metadata attributes that make it fully addressable by programmatic systems. The placement specification ensures that each inventory unit can be uniquely identified, geographically located, and contextually described.



MARKET



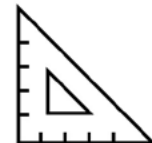
ADDRESS



LAT+LON



HEADING



SIZING

The placement metadata includes:

**Market:** The geographic market or DMA in which the placement is located.

**Address:** The physical street address of the display unit.

**Latitude and longitude:** Precise geographic coordinates.

**Heading:** The compass orientation of the display surface, expressed in degrees from north.

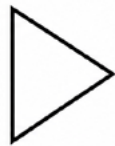
**Sizing:** The physical dimensions, pixel resolution, and display area of the screen surface, used to compute viewable distance, content scaling factors, and audience valuation.

### 3.4.3 SCHEDULING

Where placement (Section 3.4.2) describes what the display is and where it is located, scheduling describes how the display’s inventory and audience data changes over time. A digital billboard at a commuter corridor may see heavy audience and aggressive dayparting during morning and evening rush hours, while the same unit during the overnight hours may have reduced plays, different pricing, and a different profile of who is passing by. The scheduling specification captures these time-varying parameters so that DOOH inventory can be evaluated on the same dayparting and audience availability terms as other programmatically traded channels.



HORÁRIOS



EXIBIÇÕES



AUDIÊNCIA



PERMANÊNCIA



SEGMENTAÇÃO

The scheduling data specifies five time-varying dimensions:

**Hours:** The hours of operation -- the time windows during which the display is powered on and capable of showing advertising, expressed per day of week.

**Plays:** Play schedules -- the frequency and timing of ad plays within each daypart, including loop duration, spot length, and slot allocation.

**Audience:** Audience profiles -- the expected audience composition by segment for each daypart, expressed using the standard taxonomy classifications.

**Dwell:** Dwell characteristics -- average and distributional metrics for audience dwell time at each time interval, which inform frequency, exposure, and reach modeling.

**Segmentation:** Segmentation tags -- audience and contextual tags that allow targeted programmatic buying based on demographics, interests, or venue context, varying by daypart.

### 3.5 PROGRAMMATIC PROTOCOL

This section specifies how audience metrics are transmitted within programmatic advertising protocols. It ensures that DOOH inventory carrying standardized data is structurally interoperable with demand-side platforms, supply-side platforms, and ad exchanges that operate on industry-standard real-time bidding protocols.

### 3.5.1 REAL-TIME BIDDING SPECIFICATION

The standard requires the use of the OpenRTB protocol (version 2.6 or later) or equivalent programmatic messaging framework as the transport mechanism for DOOH impression data and standard currencies. The impression multiplier -- the value that quantifies the estimated audience for each individual ad play is carried within the bid request message to the exchange so that downstream buyers receive audience scale as part of the inventory signal.

### 3.5.2 FRACTIONAL IMPRESSIONS

In the physical world, an impression is a binary event. It either occurred or it did not. There are no partial impressions, and no fractional viewability -- the viewability conditions defined in Section 3.3 are either satisfied in full for a given ad exposure and audience pair, or they are not.

When transforming ad plays into audience impressions mathematically, however, the resulting multipliers are frequently expressed as decimal numbers. This is not a statement that any single ad play produced a fraction of an impression. It is a mathematical property of the transformation process, which must account for detection uncertainty, occlusion windows, dwell duration, and viewability factors in real time. The transformation pipeline operates on signals and probabilities, not certainties, and its output naturally produces fractional values. The individual decimals are not claims about any single event -- they are the mechanism by which the aggregate total arrives at the correct number.

### 3.5.3 THE PREDICTIVE NATURE OF THE BID-TIME MULTIPLIER

The impression multiplier transmitted in a programmatic bid request is inherently a modeled estimate. The auction takes place before the ad has been rendered and before the audience has assembled. During the window between bid request and ad completion, the audience is in flux -- new arrivals enter the measurement zone, existing viewers depart, and viewability conditions shift continuously. The protocol contains no mechanism for post-facto amendment or correction of the bid-time multiplier once the ad has played. Consequently, the impression column in programmatic DOOH is always a predictive value.

### 3.6 PROCESS

The process section defines how measurement methodology is documented, linked to commercial reporting, and protected under confidentiality. It ensures that every adherent’s data product can be audited for compliance while proprietary detection technologies remain protected.

#### 3.6.1 SELF-COMPLIANCE

Compliance with the standard is achieved through a self-declaration process. Participating organizations complete a standardized template -- the Confidential Disclosure of Method -- which details their specific measurement methodology.

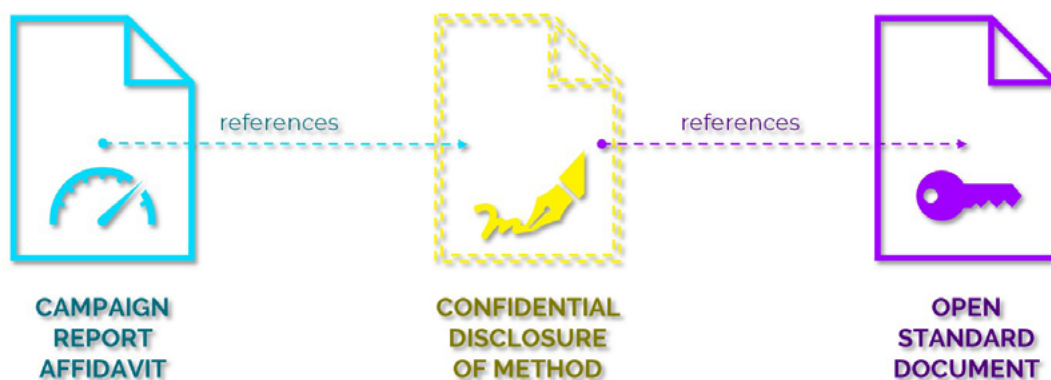


The disclosure must explain all data sources, transformations, algorithms, and assumptions used in the organization’s data model. This creates a white-box transparency framework in which the transformation logic is fully declared, even where the underlying detection technology remains proprietary.



#### 3.6.2 COMMERCIALIZATION

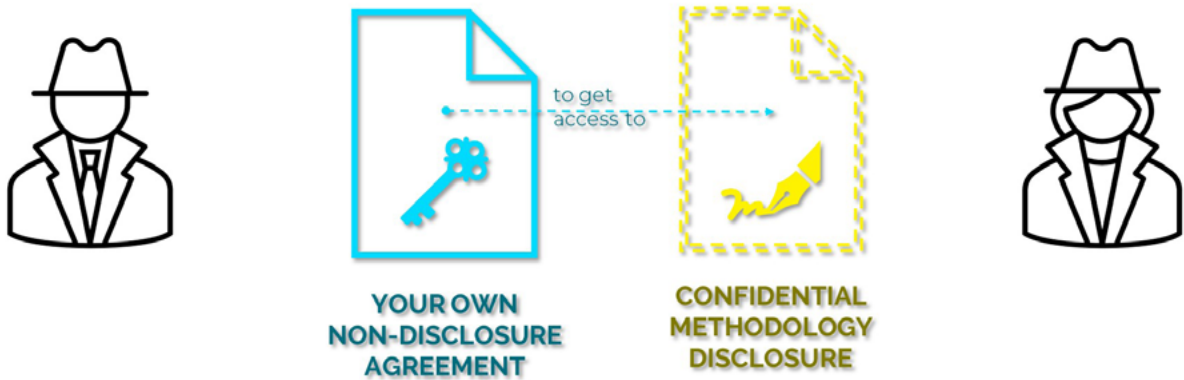
The linkage between the Confidential Disclosure of Method and the commercial reporting chain is the mechanism that gives the standard its commercial enforceability.



The Confidential Disclosure of Method is referenced directly in the publisher’s campaign invoices, reporting deliverables, and campaign affidavits. This establishes the disclosed methodology as the binding terms and conditions governing all reported metrics. An auditor, advertiser, or agency can verify that the reported metrics are consistent with the declared methodology. If they are not, the terms of trade provide a basis for redress under the procedures defined in the Compliance module.

### 3.6.3 CONFIDENTIALITY

The measurement methodology and its detailed parameters need only be shared on a need-to-know basis. They can remain protected as trade secrets under the terms of a standard non-disclosure agreement.



The standard balances the competing requirements of transparency and confidentiality. Publishers disclose the structure, logic, and assumptions of their measurement pipeline so that their outputs are verifiable. They are not required to publish their source code, sensor specifications, or algorithmic weights. Access to detailed methodological information is governed by the Confidential Disclosure of Method -- the interested party must have a legitimate commercial reason for access, and access is granted under the terms of their own non-disclosure agreement with the publisher.

## 4. COMPLIANCE



This module specifies the transformation pipeline, governance requirements, and fidelity standards by which source data is converted into compliant standard metrics. It provides the procedural instructions for any organization that wishes to produce measurement outputs conforming to the ABOOH DOOH Metrics Standard.

The module is organized into four chapters. Governance defines the principles -- integrity, auditability, transparency, and ethical responsibility -- that all adherents must satisfy. Transformations describes the four-stage pipeline -- Sanitization, Adaptation, Conversion, and Adjustment -- through which raw source data becomes a standard currency. Fidelity establishes the quality dimensions -- recency, granularity, coverage, and density -- used to characterize data products. Source Types describes the categories of data sources used in the measurement pipeline and their role in adaptation, conversion, and metric qualification.

### 4.1 GOVERNANCE

Governance defines the principles that all measurement providers must follow regardless of their detection technology or data source. These principles apply equally to publishers who measure their own inventory and to third-party measurement companies who measure on behalf of publishers.

#### 4.1.1 TRANSPARENCY

Transparency requires that the methodology disclosed in the Confidential Disclosure of Method fully describe the measurement pipeline in sufficient detail for an informed party to understand and evaluate it. Perfect transparency would mean that a buyer and seller could independently pull the same source data, apply the same disclosed transformations, and arrive at the same answer -- no hidden assumptions, no secret multipliers, no ad hoc procedures.

The standard defines three levels of transparency, each disclosing a deeper layer of the measurement methodology. Adherents progress through these levels as they advance their compliance posture:

#### **4.1.1.1 Data Sources and Measurement Origin**

The provider discloses the external data sources and vendors that feed their measurement pipeline. This includes the names and types of all upstream data providers -- such as computer vision vendors, mobile data carriers, panel suppliers, Wi-Fi analytics platforms, and content management systems -- along with the role each source plays in the pipeline. Where multiple sources contribute to a single audience figure, each source and its declared purpose must be identified. This level does not require disclosure of contractual terms, pricing, or proprietary integration details, only the identity of the data origin.

Providers shall declare whether the measurement data is produced by an independent third party or by the inventory owner itself. This declaration is a market transparency requirement: buyers want to know the structural relationship between the producer of the measurement and the entity whose inventory is being measured, regardless of whether that relationship determines the actual quality of the measurement.

A first-party data source with rigorous integrity controls may produce metrics of higher quality than a third-party measurement with weak controls. Authority does not equal integrity. But authority is a signal that buyers use to assess risk, and it must therefore be disclosed

#### **4.1.1.2 Assumptions and Constants**

The provider discloses the assumptions and constant values that underpin their measurement model. This includes the population ceilings, occupancy rates, market-share scaling factors, visibility adjustment coefficients, viewability thresholds, sensor calibration values, and any other fixed or semi-fixed parameter that converts raw detections into audience estimates. Each assumption must be stated with its value, its source (e.g., academic study, internal calibration, industry benchmark), and the conditions under which it applies. This level makes it possible to evaluate whether the numerical foundation of the metric is reasonable without examining the computational process that applies it.

#### **4.1.1.3 Transformations and Algorithms**

The provider discloses the structural logic of their transformation pipeline -- the sequence of operations that convert raw detections through sanitization, conversion, adaptation, and adjustment into the final reported metric. This includes the mathematical formulas, decision logic, filter criteria, and algorithmic architecture used at each stage. Proprietary source code, sensor firmware, and algorithmic weightings need not be published openly; access to this level may be granted under the terms of a separate non-disclosure agreement. However, the functional description of each transformation -- what goes in, what operations are applied, and what comes out -- must be complete enough in the Confidential Disclosure of Method that an informed reader can trace the lifecycle of a data point from detection to final metric.

## 4.1.2 INTEGRITY

Integrity requires that measurement data be reported as observed, without undocumented alteration, suppression, or selective manipulation. The principle mirrors the sporting convention of playing the ball as it lies: the data is the data, and the pipeline that transforms it must leave a legible trail of every intervention applied.

Data integrity shall be maintained through four mechanisms:

### **Immutability of source records**

Raw detection files, play logs, and upstream data inputs shall be archived in their original form at the point of collection. These records serve as the baseline against which all subsequent transformations are verified. Once written, source archives shall not be modified, overwritten, or pruned beyond the operations defined in Section 4.2.1 (Sanitization), which are strictly limited to anonymization, federation, and the eviction of test, malfunction, and non-audience records.

### **Logged interventions**

Any operation that changes a reported metric after initial production -- including but not limited to backfilling, reweighting, retrospective correction, manual override, or substitution of modeled values for observed values -- shall be recorded in a transformation log entry that identifies the action taken, the timestamp, the authorizing party, and the rationale. These logs are subject to audit under Section 4.1.2 and must be disclosed in the Confidential Disclosure of Method when the resulting metric is reported commercially.

### **Chain of custody**

Measurement providers shall maintain a documented chain of custody from source data collection through final metric reporting. This chain identifies every system, operator, and third-party handoff through which the data passes. When data is sourced from a third-party provider, the provider's own integrity controls -- including their source archival practices, intervention logging, and access restrictions -- shall be documented and verifiable under the terms of the governing service agreement.

### **Authority of data**

Providers shall declare whether the measurement data is produced by an independent third party or by the inventory owner itself. This declaration is a market transparency requirement: buyers want to know the structural relationship between the producer of the measurement and the entity whose inventory is being measured, regardless of whether that relationship determines the actual quality of the measurement. A first-party data source with rigorous integrity controls may produce metrics of higher

quality than a third-party measurement with weak controls. Authority does not equal integrity. But authority is a signal that buyers use to assess risk, and it must therefore be disclosed.

### 4.1.3 AUDITABILITY

Auditability means that all source data, transformation steps, and final outputs are archived and available on demand for deep cross-verification. The purpose is to enable an external party -- whether an accredited auditor, an advertiser, or an agency -- to reconstruct the measurement from raw data to final metric and detect inconsistencies, errors, or tampering.

For a data product to be auditable, the provider must maintain:

**Source data archives:** The raw or minimally processed detection records (e.g., sensor event logs, mobile bid stream records, panel survey data) for a period no shorter than twelve months from the date of collection.

**Transformation logs:** The computational steps, adjustment factors, conversion rates, and model parameters applied to transform source data into final metrics, recorded for each reporting period.

**Metadata records:** The placement, scheduling, campaign, and creative metadata that contextualize the measurement, including display uptime, content loops, and known outages.

There are 3 levels of auditability. All three levels serve the same fundamental purpose: verifying that reported figures are consistent with the declared methodology and the underlying evidence. Each relies on the same triad of source data archives, transformation logs, and metadata records defined above.

**Note:** Auditability means only that the provider's data product is structured in a manner that may be audited. It does not mean that the provider will perform audit services or supply audit data at no cost. The provision of bulk export, auditor access portals, or dedicated reconciliation support is a commercial arrangement between the provider and the requesting party, and providers may charge additional fees for audit service delivery beyond the minimum archival requirements defined above.

#### 4.1.3.1 On-demand (Post-Facto)

On demand post-campaign data is to respond to specific disputes, discrepancies, or complaints raised after a campaign has concluded. The provider is not required to

proactively distribute audit data under this mode; instead, it retains the full source records and transformation logs defined above and supplies targeted extracts only when a requesting party identifies a concrete issue requiring resolution. This level assumes that the data has been preserved and can be retrieved, but limits sharing to the records relevant to the specific matter at hand -- for example, the detection logs and adjustment factors for a particular placement on a particular daypart where reported figures deviate from the campaign report. It is the most common form of audit activity in practice, as it addresses real problems with minimal data transfer.

#### **4.1.3.2 Batched (Daily/Weekly)**

Batched data is for regularly examining data after the measurement period has concluded, using archived source records, transformation logs, and final outputs. A batched audit recipient receives a fixed dataset, applies the declared methodology, and reconciles the independently computed results against the provider's reported figures. Cross-campaign and cross-venue comparisons, trend analysis, and statistical sampling verification all require the completeness of a post-hoc dataset. This level is the only one capable of detecting data issues that manifest across time -- such as systematic over-counting during specific dayparts, gradual sensor drift, anomalies in model parameters introduced across version updates, or retrospective metric substitutions that would not be visible in a single-moment snapshot.

#### **4.1.3.3 Streamed (Real-Time)**

Streamed data is for verifying measurement data as it is produced, exposing the live or near-live feed of sensor events, transformation steps, and metric outputs to an external observer. This level allows a recipient to monitor the measurement pipeline in real time, confirming that events pass through the declared pipeline stages without undocumented intervention, suppression, or injection. It is most effective at detecting immediate anomalies -- such as sudden feed interruptions, anomalous spikes in reported impressions without corresponding detection increases, or clock drift between the advertisement layer and the audience layer. This capability is not yet widely available in the market, as it requires significant technical infrastructure to expose a live audit channel alongside the production pipeline.

### **4.1.4 RESPONSIBILITIES**

Measurement providers bear responsibility for the ethical sourcing, privacy compliance, and legal validity of all data in their pipeline. This responsibility extends across the full chain of data from collection through transformation to reporting. The standard defines three levels of privacy responsibility:

#### **4.1.4.1 Level 1: No Sensitive Data Declaration**

The provider declares that their measurement pipeline does not collect, store, or transmit data that constitutes personally identifiable information (PII) or falls under sensitive data categories defined by applicable privacy legislation. The system is architecturally designed to exclude such data at the point of detection or immediately anonymizes it to the point where it cannot be reconstructed to identify a specific individual. Under this level, the provider asserts that the risk of privacy violation is eliminated by the design of the measurement system itself.

## 4.2 TRANSFORMATIONS

The transformation pipeline converts raw source data into standard currencies through four sequential stages: Sanitization, Adaptation, Conversion, and Adjustment. Each stage operates on the output of the previous stage, progressively refining raw detections into auditable audience metrics.

Adherents must describe their implementation of each stage in their Confidential Disclosure of Method. The standard does not prescribe the specific algorithms or tools used within each stage -- it defines the function that each stage must serve and the quality of its output.

### 4.2.1 SANITIZATION



Anonymization	Federation	Pruning
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Sanitization is the first stage of the transformation pipeline. It converts raw data -- which may contain sensitive identifiers, test data, and noise -- into privacy-safe, analysis-ready data. Sanitization performs three operations: pruning, federation, and anonymization.

#### 4.2.1.1 Pruning

Pruning removes records that do not represent genuine audience activity. This includes the eviction of:

**Test data** generated during system configuration, maintenance, or validation procedures.

**Disqualified data** from sensors that were malfunctioning or out of calibration at the time of collection.

**Records originating from non-audience sources** -- such as staff members, equipment, or animals detected by a sensor -- where the detection system is capable of distinguishing these from genuine audience members.

**Data collected outside of agreed-upon measurement hours**, such as recordings made during overnight hours when a venue is closed and no advertising is being served.

Pruning is a critical quality control step. If unpruned data enters the pipeline, the downstream transformation stages will compound its errors, producing final metrics that are

systematically inflated or mischaracterized.

#### 4.2.1.2 Federation

Federation replaces vendor-specific identifiers with a common, vendor-agnostic identifier that enables deduplication across multiple data sources. When data originates from a single sensor or system, federation is not required -- the system's native identifiers are sufficient. When data from multiple sources -- such as computer vision detections combined with mobile carrier data -- must be combined, federation provides the common key that allows records from different systems to refer to the same individual without exposing the original identifiers.

#### 4.2.1.3 Anonymization

Anonymization replaces sensitive user identifiers with privacy-safe anonymous references that preserve the ability to deduplicate and track individuals without exposing personal data. This includes replacing MAC addresses, device IDs, advertising IDs, and user identifiers with globally unique identifiers (GUIDs) that cannot be reverse-engineered to identify a specific person.

Computer vision data is anonymized by design -- it processes visual input for face detection and demographic estimation without retaining images, video frames, or facial biometric templates. Any measurement system based on visual detection must confirm that no identifiable imagery is stored, transmitted, or accessible at any point in the pipeline.

### 4.2.2 ADAPTATION

Adaptation is the transformation from a raw detection metric into an audience metric. Different detection technologies produce different raw metrics -- cameras count faces, Wi-Fi and Bluetooth sensors count probe signals, SDK integrations count device pings, ticket systems count individual transactions, player logs count ad plays. None of these raw metrics is directly equivalent to the audience metric required by the standard. Adaptation bridges this gap so that counts from different detection modalities can be compared and combined.

The adaptation stage operates through three sequential functions, each resolving a different kind of gap between what a sensor measures and what the audience actually is.



Each detection modality has its own source properties, biases, and error characteristics, and the standard requires that the adaptation model be disclosed for every source used in the measurement pipeline. Specific adaptation requirements for each source type are documented in Section 4.4 (Source Types).

The adaptation model, its input parameters, and its correction factors must be fully described in the Confidential Disclosure of Method.

#### 4.2.2.1 Non-Human Exclusion

The first function of adaptation removes detections that do not correspond to human audience members. Many sensor systems detect signals from objects, infrastructure, or non-human entities that are not part of the audience. The adaptation model must identify the signatures of non-human detections and exclude them before any further transformation is applied. Examples include filtering Wi-Fi detections from IoT routers, smart thermostats, vehicular trackers, and other non-phone devices that appear in the detection stream; or filtering computer vision detections that correspond to mannequins, posters, reflections, or other visual artifacts without a corresponding human presence. Where the detection system is capable of distinguishing human from non-human at the point of collection, this function may be partially or entirely satisfied by the sensor itself, but the adaptation model must declare what is excluded and on what basis.

#### 4.2.2.2 Zone Qualification

The second function of adaptation removes detections from sources that, while human, are not within the display’s viewability zone. A sensor may detect audience members who cannot actually see the ad -- for example, Wi-Fi or Bluetooth signals picked up through walls from adjacent rooms, mobile device pings from a vehicle on an adjacent roadway, or computer vision detections of people at the extreme edge of a camera’s field of view who are outside the display’s viewable angle. Zone qualification applies spatial filters to ensure that only detections within the geometric viewability envelope -- defined by viewable angle, viewable distance, and viewable surface con-

straints from Section 3.3 -- are carried into the audience metric. Where the raw detection data includes positional information, zone qualification can be deterministic. Where positional data is coarse or absent, it must be modeled probabilistically.

### 4.2.2.3 Proxy Simulation

The third function of adaptation converts the remaining, qualified detections -- which are proxies for audience presence, not audience presence itself -- into the audience metric. No sensor directly counts audience members in most real-world conditions. A phone ping is a proxy for a person. A face detection is a proxy for a person. A ticket scan is a proxy for a person. The adaptation model applies scaling coefficients to translate the proxy count into the estimated audience. This includes assumptions such as one device equals one user (or correcting for multi-device users), applying carrier market-share multipliers to scale a partial subscriber sample to the full population, adjusting for the percentage of mobile devices with discoverability disabled, and estimating vehicle occupancy from vehicle counts. Proxy simulation is the stage where the most significant modeling assumptions enter the pipeline, and the standard requires the most thorough disclosure of its parameters in the Confidential Disclosure of Method.

### 4.2.3 CONVERSION

Conversion connects the physical measurements produced by each source to the audience metrics required by the standard. No single source produces all the metrics directly; what a sensor measures is usually only one level in the chain. Conversion rates bridge the gaps between these levels.



The standard defines four conversion rates, each bidirectional. Given any metric at one level and a disclosed conversion rate for the transition to the adjacent level, the provider can derive the metric on the other side. Where a pipeline must move two levels at once — for example, converting vehicle counts directly to visits — the composite conversion is the product of the intermediate rates.

### 4.2.3.1 Occupancy

Occupancy converts a vehicle metric — cars, trains, buses, elevators, or other physical carriers of people — into a user audience metric. The conversion rate is the average or modeled number of people per vehicle. For example, a transit station counting 200 train arrivals applies an occupancy rate of 45 passengers per train to estimate 9,000 users. Where the raw detection is already a user-level metric, occupancy is not required. Going in the reverse direction, the inverse conversion estimates the number of vehicles that would produce a known audience size.

### 4.2.3.2 Recurrence

Recurrence converts between user counts and session counts. Not every user generates a session — some pass through the measurement zone repeatedly in the same period and are deduplicated at the user level. Conversely, a single user may generate multiple sessions across different time windows. The recurrence rate describes the average number of sessions per user within the reporting period. A recurrence rate of 1.0 means every user is a first-time visitor with exactly one session; higher values indicate return visitors. Going in the reverse direction, applying the inverse converts session counts to unique user counts.

### 4.2.3.3 Visitation

Visitation converts between session counts and display-level visit counts. A single session may involve the audience passing through zero, one, or multiple display zones within a venue. The visitation rate describes the average number of displays encountered per session. Where sessions and visits are at parity — every visitor passes exactly one screen — the rate is 1.0. Where one screen draws traffic while others in the same zone are bypassed, the rate is below 1.0. Going in the reverse direction, applying the inverse converts aggregated display visits back to total venue sessions.

### 4.2.3.4 Consecution

Consecution converts between a visit — a qualified presence at a display — and the number of ad exposures during that visit. Unlike dwell time, which measures presence in seconds or minutes, consecution counts the number of ads the audience is exposed to while present. For example, an audience member might see a few ads in a row and therefore will generate multiple ad impressions during the same visit. This conversion bridges the temporal nature of audience presence to the structural nature of ad delivery. Going in the reverse direction, applying the inverse converts total impression counts back to visit counts.

#### 4.2.4 ADJUSTMENT

Adjustment is the final qualification stage. It applies viewability and visibility factors to the converted audience metric to produce the final currency that advertisers use to plan, buy, and evaluate campaigns. The adjustment is the step that distinguishes a raw audience count from a quality-qualified impact.

Measured Audience



Viewability Adjustment



Adjusted Audience



The concept of adjustment is recognized internationally, though the terminology varies. The following table documents the equivalent terms used by major measurement frameworks:

Association	Raw Measurement	Adjustment Factor	Resulting Currency
WOO	Contacts	Visibility Adjustment	VAC (Visibility Adjusted Contact)
India	Circulation	Visibility Multiplier	Adjusted Impressions
United States	OTS (Opportunity-to-See)	Visibility Likelihood	LTS (Likelihood-to-See)
Nigeria	OTS (Opportunity-to-See)	Visibility Likelihood	LTS Impressions
OMC South Africa	OTS (Opportunity-to-See)	Visibility Adjustment	Net Impressions

The adjustment factors incorporate the viewability parameters defined in Section 3.3 -- viewable angle, viewable distance, viewable surface, and viewable duration -- as well as any additional visibility research data specific to the venue, placement, or audience flow.

## 4.3 FIDELITY

Fidelity is the degree to which a reported metric accurately represents the underlying audience phenomenon it is intended to measure. The standard defines four dimensions of fidelity and uses them to characterize the quality profile of data products from different providers.

### 4.3.1 RECENCY

Recency describes the freshness of the data that underlies the audience metric. It measures the time between when the data was collected and when it is used to produce a reported metric.

The standard defines four levels of recency:

#### 4.3.1.1 Live

Data is collected and processed in real time, with a latency of one second or less between the audience event and the metric update. This is the highest level of recency and supports real-time programmatic bidding and live campaign monitoring.

#### 4.3.1.2 Batch

Data is collected continuously but processed on a scheduled cycle, typically daily or less. The reported metric reflects audience activity that occurred within the most recent batch window. This is the most common recency level for campaign reporting and post-campaign analysis.

#### 4.3.1.3 Seasonal

Data is collected through periodic studies or surveys that represent audience behavior during a defined season, typically spanning weeks or months. The reported metric is based on models trained on seasonal data and does not reflect day-to-day variation.

#### 4.3.1.4 One-time

Data is collected through a single study or survey that is not periodically refreshed. The reported metric relies on historical data that may be years old and is the lowest level of recency.

## 4.3.2 GRANULARITY

Granularity describes the temporal resolution of the data -- whether it measures at the atomic level of individual events or at aggregated intervals.

The standard defines four levels of granularity:

### 4.3.2.1 Atomic

Data is recorded at the individual event level -- each detection, each ad play, each session boundary is preserved as a discrete record. This is the highest level of granularity and supports exact verification, device-level compliance checking, and fine-grained attribution.

### 4.3.2.2 Fine

Data is aggregated into short intervals, typically one hour or less. This supports day-part analysis and near-time optimization.

### 4.3.2.3 Coarse

Data is aggregated into daily or longer intervals. This supports weekly and monthly reporting but obscures intra-day variation.

### 4.3.2.4 Constant

A single fixed value is applied regardless of time -- for example, a constant circulation figure used for all hours of the day. This is the lowest level of granularity.

## 4.3.3 COVERAGE

Coverage describes the breadth of measurement -- how comprehensively the measurement system covers the audience universe of the venue and the media placements within it.

The standard defines four levels of coverage:

### 4.3.3.1 Deep (multimodal)

The venue is measured using multiple independent measurement modalities simultaneously -- for example, computer vision combined with mobile data and panel input. Cross-modal verification increases confidence in the final metric.

### 4.3.3.2 Full (individual)

Every display unit and every audience entry point at the venue is instrumented with measurement technology. The system produces individual-level data for the full audience universe.

### 4.3.3.3 Partial (sampling)

Measurement covers only a subset of the venue -- selected display units, selected entry points, or selected time periods -- and the full audience is estimated through statistical sampling.

### 4.3.3.4 None (extrapolated)

No measurement is taken at the venue. The audience figure is derived entirely from external data sources such as census statistics, traffic databases, or historical studies, extrapolated to the current conditions.

## 4.3.4 DENSITY

Density describes the relationship between the volume of raw detection data and the volume of final metric output. It measures whether the measurement system is operating at full detection capacity, at a statistically representative level, or below the threshold of meaningful inference.

The standard defines four levels of density:

### 4.3.4.1 High intensity

The detection system captures a high proportion of the total audience, typically more than one detection per audience member through redundant sensors or complementary modalities. The ratio of detections to final impacts is high, providing strong statistical confidence in the adaptation and adjustment steps.

### 4.3.4.2 Low intensity

The detection system captures at least one detection per audience member on average. The ratio of detections to final impacts is approximately one-to-one, providing adequate statistical support for reporting.

### 4.3.4.3 Low virtuality

The detection system captures a small fraction of the total audience, but sufficient data exists to support statistical modeling and extrapolation with known error margins. The adaptation model is the primary driver of the final metric.

### 4.3.4.4 High virtuality

The detection system captures minimal or no direct audience data. The reported metric is primarily modeled, with the adaptation factor constituting a large multiplier relative to the detection input. This is the lowest density level and carries the highest uncertainty.

## 4.4 SOURCE TYPES

The standard recognizes the following categories of data sources. Each source type has characteristic properties and inherent limitations that must be disclosed in the Confidential Disclosure of Method. Adherents may use any combination of source types, provided that their use is documented and the resulting metric meets the fidelity requirements claimed.

### 4.4.1 STUDIES

Academic or commissioned research studies that measure audience behavior through controlled observation, surveys, or field experiments. Studies provide the foundational data for adaptation models and visibility research. They are periodic rather than continuous and serve as a calibration layer rather than a primary measurement source.

#### 4.4.1.1 Conversion Rate Studies

Dedicated field studies designed to calibrate one or more conversion rates defined in Section 4.2.3. Observers stationed at a venue count passers-by, record dwell times, track display exposure sequences, and measure repeat visitation over the observation period.

**Role in adaptation and conversion:** These studies produce the empirical basis for the occupancy, recurrence, visitation, and consecution conversion rates. The observed dwell-time distribution divided by the display's creative loop duration yields the consecution rate. The ratio of repeat-observed individuals to total observed individuals yields recurrence. Once calibrated, these conversion rates are applied to continuous detection sources (e.g., computer vision, mobile data) to convert their raw detections into impression-level metrics.

#### 4.4.1.2 Segmentation Studies

Field surveys that classify observed audiences by demographic attributes such as age, gender, income, education, or commuter status. Segmentation studies typically use intercept interviews, short questionnaires, or photographic coding of observable attributes.

**Role in adaptation and conversion:** Segmentation studies enrich the user metric by attaching demographic attributes to otherwise anonymous detection streams. They do not directly produce conversions but calibrate the proxy simulation step by providing the demographic penetration rates needed to adjust device-to-person ratios for different population subgroups (e.g., smartphone ownership rates by age band).

#### 4.4.1.3 Origin-Destination Studies

Travel-route studies that map how audiences move through and between urban zones, including origin point, destination, route taken, and mode of transport. These combine travel diaries, GPS-tagged journeys, and observer-coded route validation.

**Role in adaptation and conversion:** Origin-destination studies directly calibrate the visitation conversion rate for multi-display venues, as the observed fraction of travelers passing multiple display locations reveals what portion of the total venue audience is exposed to each screen. They also inform zone qualification by identifying common pedestrian corridors that fall outside display viewability zones.

#### 4.4.1.4 Visibility and Viewability Studies

Research focused on how viewing distance, angle, occlusion, and environmental conditions affect the probability that displayed content is actually perceived. These may use eye-tracking equipment, simulated display mock-ups, or field observation to quantify viewability thresholds.

**Role in adaptation and conversion:** Viewability studies define the viewability geometry parameters used in zone qualification (Section 4.2.2.2) -- specifically the viewable angle, viewable distance, and viewable surface thresholds from Section 3.3. They calibrate the adjustment factor applied at the adaptation-to-metric boundary to discount detections that fall below the perceptibility threshold.

### 4.4.2 CENSUS

Official government population data, including demographic segmentation by geographic region. Census data provides the population ceiling against which audience measurements can be benchmarked. Its primary weakness is that it is refreshed infrequently -- typically every five to ten years -- and does not capture commuter populations, tourists, or transient traffic patterns.

#### 4.4.2.1 National Population Census

The authoritative resident population count for Brazil, produced by the national statistics institute, with demographic composition and geographic distribution at municipal and micro-regional scales.

**Role in adaptation and conversion:** Census data does not drive adaptation directly but constrains the proxy simulation step. The census population for a venue's catchment area serves as the upper bound that no adapted user count should exceed, preventing runaway scaling when penetration multipliers are applied to partial samples.

#### 4.4.2.2 Household Survey Data

Periodic sample-based household surveys conducted between census cycles, providing updated estimates of population, income distribution, employment, and household composition at regional and metropolitan scales.

**Role in adaptation and conversion:** Household survey data calibrates demographic segmentation within the proxy simulation step. When a detection source produces an anonymous user count, the survey's demographic composition for the venue's catchment area allows the provider to segment users into age, income, and employment groups that inform ad-category targeting and reach estimation.

#### 4.4.2.3 Commuter Flow Statistics

Government-produced data on daily commuter volumes, route preferences, and mode-of-transport distribution between residential and employment zones, including inbound and outbound traffic flows for major urban corridors.

**Role in adaptation and conversion:** Commuter flow statistics calibrate the occupancy conversion rate for transit-oriented venues. The known ratio of drivers to passengers on major commuter routes, combined with vehicle counts from a detection source, provides the baseline occupancy rate for converting vehicle metrics to user metrics.

### 4.4.3 TICKETS

Ticket sales and access records from venues such as transit systems, stadiums, cinemas, exhibitions, and paid attractions. Ticket data provides reliable session counts for venues where every entrant must purchase access. Its typical limitation is daily or coarser granularity, with limited demographic segmentation.

#### 4.4.3.1 Entrance and Exit Counts

Records of people entering and exiting a venue, captured by any counting mechanism -- automated gate sensors, turnstile logs, infrared beam counters, video-based people counters, or manual headcounts. These records provide an estimate of the total audience passing through the venue during a measurement period, regardless of whether access is ticketed or free.

**Role in adaptation and conversion:** Entrance and exit counts provide the raw venue-entry count used in proxy simulation to convert the entry count into an estimated user universe. Zone qualification distinguishes between entry points and routes that pass through the display's viewable zone and those that bypass it, converting raw entries into display-specific visits. The entrance-to-exit delta during a reporting period also calibrates the venue's net occupancy, which feeds the occupancy conversion rate when combined with display-level detection counts.

#### 4.4.3.2 Group and Multi-Pass Tickets

Ticket records that represent multiple people under a single transaction (e.g., family passes, group bookings) or unlimited access over multiple entries (e.g., daily or weekly transit passes).

**Role in adaptation and conversion:** Group tickets define the occupancy conversion rate's per-entry multiplier. Where a single tap record represents multiple entrants, the known group-size distribution calibrates the conversion from event count to user count. Multi-pass records calibrate the recurrence conversion rate, as a single card-holder generating multiple taps over the reporting period represents a repeated user.

#### 4.4.4 RECEIPTS

Point-of-sale transaction records from retail locations. Receipt data can serve as a proxy for footfall and session counts in retail-adjacent venues. It may include sales figures useful for return-on-ad-spend calculations, though proving direct attribution from OOH exposure to point-of-sale transaction is difficult without complementary data sources.

##### 4.4.4.1 POS Transaction Logs

Timestamped sales records from retail registers, including transaction value, payment method, and register location.

**Role in adaptation and conversion:** POS transaction counts are converted into estimated shopper sessions through proxy simulation by applying a transactions-per-shopper ratio (deduplicating multiple transactions by the same shopper in the reporting period). Zone qualification limits receipts to those generated at registers within or adjacent to the display's viewable zone. Once converted to sessions, the visitation and consecution conversion rates produce display-specific impressions.

##### 4.4.4.2 Loyalty and Parking Records

Registered shopper data from loyalty-card programs and mall parking payment systems, typically capturing entry-to-exit timestamps, repeat visit frequency, and sometimes demographic registration information.

**Role in adaptation and conversion:** Loyalty and parking records directly measure recurrence, as the same registered identifier appearing across multiple venue visits yields the recurrence conversion rate. Entry-to-exit timestamps define session duration, which, when combined with the display's creative loop schedule, calibrates the consecution conversion rate for retail environments.

#### 4.4.5 APPLICATION

Mobile application analytics data -- location signals, app usage patterns, and demographic information collected through embedded SDKs. Application data can contribute to user identification, session construction, and audience segmentation. A limitation of application data is that it records device attention directed at the app, not at the OOH media, and therefore represents an indirect rather than direct audience measurement.

##### 4.4.5.1 SDK Location Feeds

Device-level location pings transmitted from in-app SDKs to a data aggregator, including timestamp, latitude/longitude, device identifier, and sometimes demographic segmentation.

**Role in adaptation and conversion:** SDK feeds provide the primary input for zone qualification through geofenced presence detection. Each device ID within the display's viewable geofence is converted to a user through proxy simulation, incorporating penetration rate and device-to-person multipliers. The sequential position history from SDK feeds calibrates visitation by revealing how many distinct display geofences the same device passed during a single venue session.

##### 4.4.5.2 Footfall Attribution Datasets

Aggregated counts of unique mobile devices detected at named physical venues, often paired with visit frequency, average dwell time, and demographic composition derived from the underlying SDK sample.

**Role in adaptation and conversion:** Footfall attribution datasets calibrate the recurrence conversion rate by providing the fraction of unique devices returning to a venue over multiple time windows. They also calibrate the visitation rate when venue-level footfall counts are compared against display-level detection counts from a complementary source (e.g., computer vision cameras at the same venue).

##### 4.4.5.3 Telecom-Operated App Ecosystems

Application data sourced from carrier-owned or carrier-partnered apps, combining location signals with carrier-verified subscriber identity and demographic profiles.

**Role in adaptation and conversion:** The subscriber-linked identity in telecom-operated app data reduces the uncertainty in proxy simulation, as the carrier's market share is known and the device-to-person mapping is more reliable than anonymous SDK feeds. These data sets calibrate the recurrence conversion rate with high precision and inform occupancy calibration when the subscriber density at a venue is compared against independent vehicle or sensor counts.

## 4.4.6 GPS

Aggregate GPS location data from mobile devices. GPS data identifies the geographic position of devices and can be filtered to establish audience presence within a defined geofence around an OOH display. GPS data is not a direct proxy for audience presence, as devices include non-phone items such as vehicle trackers and IoT devices, and the update frequency depends on the device owner's app usage patterns.

### 4.4.6.1 Navigation and Mapping Data

GPS position traces from navigation and mapping applications, capturing movement trajectories along road networks and through commercial zones, including origin, destination, route, and speed profiles.

**Role in adaptation and conversion:** Movement trajectories calibrate the visitation conversion rate, as the sequential position trace reveals which displays a device passed within viewable range during its journey. Zone qualification applies geofenced boundaries to retain only position fixes within the display's viewability polygon, and speed profiling supports non-human exclusion by filtering vehicle-tracker signals inconsistent with pedestrian movement.

### 4.4.6.2 Fleet and Logistics Traces

GPS position records from fleet-management and logistics platforms, capturing vehicle location, speed, stop duration, and route assignment for commercial and delivery fleets.

**Role in adaptation and conversion:** Fleet traces provide the vehicle-count input for the occupancy conversion rate in road-side and transit-oriented DOOH environments. The known vehicle type and route characteristics enable calibration of occupant-type multipliers (e.g., delivery van vs. personal car), converting vehicle detections to estimated user counts through proxy simulation.

### 4.4.6.3 Location Intelligence APIs

Commercial APIs providing geofenced presence summaries, dwell-time estimates, and venue-visit counts aggregated from GPS and mobile signal sources. These products deliver processed venue-level metrics rather than raw position events.

**Role in adaptation and conversion:** Location intelligence products serve as the zone-qualified input for proxy simulation. Because the API provider has already applied geofencing and dwell-time filtering, the measurement provider applies non-human exclusion and the conversion-chain multipliers to transform API venue-visit counts into display-specific impression metrics.

#### 4.4.7 CARRIER

Mobile telecommunications carrier data -- anonymized subscriber location records collected through cellular network handsets. Carrier data is useful for establishing audience presence for the carrier's subscriber base. To estimate total audience, the data must be scaled upward to account for the carrier's market share relative to other carriers in the area. Carrier data is highly granular at the raw level, but carriers typically sell only coarse summaries to third parties.

##### 4.4.7.1 Cell-Tower Handoff Records

Anonymised records generated when a mobile device transitions between cellular network sectors, providing coarse-grained location estimates and subscriber presence signals at the cell-site or sector level.

**Role in adaptation and conversion:** Handoff records provide the raw subscriber count for proxy simulation. The observed count is multiplied by the inverse of the carrier's local market share to estimate the total audience. Cell-sector position filtering serves as zone qualification when the display falls within the serving sector's coverage envelope.

##### 4.4.7.2 Clean Room Aggregated Records

Privacy-preserving cross-carrier data products where multiple carriers' subscriber records are jointly queried within a secure environment, producing a combined mobility summary without exposing individual carrier data to any single party.

**Role in adaptation and conversion:** Clean room data sets provide a near-complete population sample, reducing the uncertainty in proxy simulation (the market-share multiplier is closer to 1.0 when multiple carriers are represented). They calibrate the recurrence conversion rate at scale, as cross-carrier identity persistence enables tracking users who switch devices or SIM cards.

##### 4.4.7.3 Venue-Level Mobility Summaries

Carrier-produced venue-footfall estimates derived from aggregated subscriber records, providing daily or hourly counts of unique devices detected at named venues such as shopping malls, transit stations, or entertainment complexes.

**Role in adaptation and conversion:** Venue-level summaries provide the audience universe for the visitation conversion rate. By comparing the carrier's venue-footfall count against display-level detection counts (e.g., from cameras), the provider calculates what fraction of the venue audience actually encountered each display.

## 4.4.8 BLUETOOTH

Bluetooth Low Energy (BLE) probe detection -- passive scanning of BLE-enabled devices within range of a beacon. BLE detection does not require device pairing. However, modern mobile privacy features randomize device MAC addresses on a cycling basis, which limits BLE's effectiveness for long-term recurrence measurements and deduplication over extended time periods.

### 4.4.8.1 Dedicated Beacon Probe Streams

Raw probe-request data captured by dedicated BLE beacons and gateway receivers, including MAC address (or randomized equivalent), RSSI, and timestamp.

**Role in adaptation and conversion:** Probe streams feed all three adaptation functions. Non-human exclusion filters stationary infrastructure MACs. Zone qualification uses RSSI to estimate device position within the viewability envelope. Proxy simulation applies the discoverability correction factor and a device-to-person ratio to convert MAC counts into user estimates. Session dwell times derived from signal duration calibrate the consecution conversion rate when mapped against the display's creative loop schedule.

### 4.4.8.2 Co-Located AP Bluetooth Data

BLE probe data captured by Wi-Fi access points with integrated Bluetooth receivers, producing a Bluetooth data set alongside Wi-Fi probe data from the same physical location.

**Role in adaptation and conversion:** Co-located Bluetooth provides cross-modal validation for zone qualification. When both Wi-Fi and Bluetooth detect the same device position (via RSSI triangulation from AP-mounted sensors), the measurement provider can apply tighter spatial filtering, improving the precision of the visitation rate. The Bluetooth data additionally compensates for Wi-Fi probe limitations in areas where BLE discoverability is higher than Wi-Fi discoverability.

### 4.4.8.3 Multi-Beacon Signal Histories

Aggregated event logs linking the same device MAC address across multiple beacon receivers within a venue, capturing the sequence, timing, and signal strength of detections at each beacon location.

**Role in adaptation and conversion:** Multi-beacon signal histories directly calibrate the visitation conversion rate, as the number of distinct beacon locations a device was detected at reveals how many display zones the device passed through during a single venue session. The sequence order also informs dwell-time estimation, which feeds the consecution conversion rate.

#### 4.4.9 WI-FI

Wi-Fi data from access points, usable in two modes. Passive mode (Wi-Fi probe collection) detects probe requests from nearby devices but has diminished effectiveness due to recent privacy changes on mobile operating systems that randomize MAC addresses. Active mode -- where users voluntarily connect to a hotspot and register -- is fully privacy-compliant and provides a rich data set useful for session construction, recurrence analysis, and audience qualification.

##### 4.4.9.1 Passive Probe Logs

Unassociated probe-request frames transmitted by mobile devices searching for known networks, detected by Wi-Fi access points without requiring a connection. Includes MAC address and RSSI.

**Role in adaptation and conversion:** Passive probe logs are adapted through the same non-human exclusion, zone qualification (RSSI-based position estimation), and proxy simulation (discoverability correction) as Bluetooth probe data. The resulting user and session counts feed into the visitation conversion rate when multiple access points detect the same device at different locations within the venue.

##### 4.4.9.2 Active Connection Records

Voluntary Wi-Fi hotspot connections where the user authenticates through a captive portal, providing a confirmed device identity, session start/end timestamps, and connected access point.

**Role in adaptation and conversion:** Active connection records provide deterministic zone qualification (the connected access point defines the user's position) and precise session boundaries for the recurrence conversion rate. Registered users identified across multiple sessions yield a high-confidence recurrence rate. The visitation rate is calibrated by comparing the number of connected users against the number who detected at least one display's Bluetooth signal.

##### 4.4.9.3 Captive-Portal Demographics

Demographic information collected through the captive-portal registration process (age, gender, email, opt-in consent), linking a known identity to the Wi-Fi session. **Role in adaptation and conversion:** Captive-portal data enriches the user metric with demographic attributes, supporting audience segmentation in the reported metric. It does not directly modify adaptation parameters but calibrates the penetration rate used in proxy simulation, as the opt-in registration rate provides an empirical benchmark for the fraction of the total audience captured by active vs. passive modes.

## 4.4.10 Computer Vision

Computer vision camera systems that detect, count, and characterize people within the camera’s field of view. When collocated with the display, computer vision is the most direct method of measuring audience presence, visits, and viewability. It provides the strongest basis for real-time impression counting and dwell time measurement. Its primary regulatory limitation is that it cannot determine individual identity due to privacy regulations, which restricts its use for reach and frequency deduplication across displays without complementary data sources.

### 4.4.10.1 Face and Body Detection Streams

Anonymised face and body counts from camera-based detection systems, including timestamp, position within the camera frame, and estimated demographic attributes (age band, gender).

**Role in adaptation and conversion:** Face detection feeds the user metric directly through non-human exclusion (a detected face is almost certainly a person, though mannequins and reflections require body-detection filtering). Body detection with heading analysis enables zone qualification by excluding bodies oriented away from the display. The user count, after zone qualification, feeds directly into the visit calculation without requiring proxy simulation, making computer vision the adaptation pipeline with the fewest modeling assumptions.

### 4.4.10.2 Dwell Time Distributions

Aggregated distributions of how long detected individuals remained within the camera’s field of view, typically reported as percentile summaries or histogram bins rather than individual records.

**Role in adaptation and conversion:** Dwell time distributions directly calibrate the consecution conversion rate. The average dwell time divided by the display’s creative loop duration yields the average number of ad slots seen per visit. The dwell distribution’s tail (long-linger vs. quick-pass) also informs the viewable duration threshold for distinguishing visits from pass-throughs.

### 4.4.10.3 Vehicle Detection and Classification

Camera-based counts of vehicles, classified by type (sedan, bus, motorcycle, truck, cyclist), often combined with estimated speed and occupancy characteristics.

**Role in adaptation and conversion:** Vehicle detection provides the raw input for the occupancy conversion rate in road-side and highway DOOH environments. Known vehicle-type occupant multipliers (e.g., 1.5 occupants per sedan, 30 per bus, 1 per motorcycle) convert vehicle counts to user estimates in a single proxy simulation step. The classification also informs speed-based adjustment, as faster-moving vehicles have shorter viewability windows that reduce effective consecution.

#### 4.4.10.4 Multi-Camera Tracking

Cross-camera detection logs that track the same anonymised individual across multiple camera fields of view within a venue, mapping the individual's trajectory through different display zones.

**Role in adaptation and conversion:** Multi-camera tracking directly calibrates the visitation conversion rate by measuring the fraction of users who passed multiple display zones during a single venue session. It also refines zone qualification by providing a more complete picture of the audience's spatial trajectory within the venue than single-camera field of view can achieve.

#### 4.4.11 PLAYER LOGS

Content management system play logs -- records of which ad creative was displayed on which screen at which time. Player logs are the primary source for the advertisement exposure layer, not the audience layer. Not all player logs are equivalent. The highest-quality player logs are measured at the edge -- confirming what was actually rendered on the display surface, including verification that the display was powered on and rendering correctly. Lower-quality play logs record only the signal sent from the CMS, without confirmation of what was actually shown on the physical screen.

##### 4.4.11.1 CMS-Scheduled Play Records

Planned insertion-order records from the content management system, listing which creative was scheduled to play on which display, at which time, for how long, and in what loop structure.

**Role in adaptation and conversion:** CMS-scheduled play records define the denominators for the consecution conversion rate. The creative loop length (e.g., six 10-second slots per 60-second cycle) determines how many ad opportunities exist per unit of dwell time. The visitation-to-impression conversion is: visits multiplied by (dwell time divided by loop duration) equals total impression slots. CMS records also support non-human exclusion by flagging scheduled maintenance windows and test creative playback.

##### 4.4.11.2 Edge-Level Proof-of-Play Records

Actual playback confirmations measured at the media player or display hardware, recording the creative file rendered, render duration, screen power state, and any playback anomalies (dropped frames, signal loss, display malfunction).

**Role in adaptation and conversion:** Edge-level proof-of-play records validate that the advertisement exposure layer was delivered correctly, confirming the denominator of the consecution conversion rate against the CMS schedule. They also refine non-human exclusion by identifying playback events on screens that were powered off, malfunctioning, or displaying incorrect content -- events that should not be counted toward the exposure side of the impression calculation.

#### 4.4.12 DISPLAY LOGS

Display logs are generated by the display hardware. They provide evidence that can be used in accountability and measurement of the advertisement exposure layer. They provide detailed information about the display's operational state, including brightness levels, power status, and any anomalies that may affect the ad's visibility or playback.

##### **4.4.12.1 Brightness Logs**

Brightness transitions between operating modes shall be gradual, occurring over a minimum of 30 seconds. Displays shall be equipped with automatic ambient light sensors sampling at intervals not exceeding 10 seconds, with readings averaged over a minimum 30-second rolling window.

# aboooh

METRICS STANDARD

**CONFIDENTIAL  
DISCLOSURE  
OF METHOD**



Provider: [Legal entity name] | Role:  Publisher  Measurement Provider   
 Data Company Reference: ABOOH DOOH Metrics Standard v1.0.0 |  
 Effective: [YYYY-MM-DD] | Version: [1.0]

All definitions, thresholds, formulas, and taxonomies are defined in the Standard (Section 4).  
 This document declares the Provider’s implementation choices.

## Part 1. Compliance Checklist

Aspect	Standard	Selection
Integrity	§4.1.1	<input type="checkbox"/> Auto-declaration <input type="checkbox"/> Outside verification — Verifier: <input type="checkbox"/>
Authority	§4.1.1	<input type="checkbox"/> Independent third party <input type="checkbox"/> Self-measured
Source Immutability	§4.1.1	<input type="checkbox"/> Yes <input type="checkbox"/> No
Intervention Logging	§4.1.1	<input type="checkbox"/> Yes <input type="checkbox"/> No
Chain of Custody	§4.1.1	<input type="checkbox"/> Yes <input type="checkbox"/> No
Auditability	§4.1.2	<input type="checkbox"/> On-demand <input type="checkbox"/> Batched <input type="checkbox"/> Streamed — Retention: <input type="checkbox"/> 12 mo <input type="checkbox"/> 24 mo
Transparency	§4.1.3	<input type="checkbox"/> Data Sources <input type="checkbox"/> + Assumptions <input type="checkbox"/> + Transformations
Responsibilities	§4.1.4	<input type="checkbox"/> No Sensitive Data <input type="checkbox"/> Legal Basis <input type="checkbox"/> Third-Party Verified

## Part 2. Ad Playback

CMS Vendor: [vendor name] Product / Platform: [product name, version]

Player Logs (§4.4.11):  Scheduled (4.4.11.1)  Proof-of-Play (4.4.11.2)

Display Logs (§4.4.12):  Brightness logs present  Not applicable

Dimension	Level
Recency (§4.3.1)	<input type="checkbox"/> Live <input type="checkbox"/> Batch <input type="checkbox"/> Seasonal <input type="checkbox"/> One-time
Granularity (§4.3.2)	<input type="checkbox"/> Atomic <input type="checkbox"/> Fine <input type="checkbox"/> Coarse <input type="checkbox"/> Constant
Coverage (§4.3.3)	<input type="checkbox"/> Deep <input type="checkbox"/> Full <input type="checkbox"/> Partial <input type="checkbox"/> None
Density (§4.3.4)	<input type="checkbox"/> High intensity <input type="checkbox"/> Low intensity <input type="checkbox"/> Low virtuality <input type="checkbox"/> High virtuality

Adjustment (§4.2.4)

Viewability parameters applied:  Angle  Distance  Surface  $\geq$  50%  Duration  $\geq$  1s/2s  
 Additional visibility research:  Yes  No  
 Resulting currency(ies):  Viewable Impressions  VAC  Adjusted Impressions  LTS  Net Impressions  Other:

Display Brightness (§3.3.5)

Applies:  Yes — digital displays  No — static only  
 Ambient light sensors:  Installed  Not installed  
 Compliance:  Old Brightness Rules  New Brightness Rules  Non-compliant

### Part 3. Audience Measurement

Each source used in the audience measurement pipeline. One row per distinct source or dataset.

#	Source Type (§4.4.x)	Vendor	Dataset / Product
1	<input type="checkbox"/> CV (4.4.10) <input type="checkbox"/> Player Logs (4.4.11) <input type="checkbox"/> Display Logs (4.4.12) <input type="checkbox"/> Wi-Fi (4.4.9) <input type="checkbox"/> Bluetooth (4.4.8) <input type="checkbox"/> GPS (4.4.6) <input type="checkbox"/> Carrier (4.4.7) <input type="checkbox"/> App/SDK (4.4.5) <input type="checkbox"/> Studies (4.4.1) <input type="checkbox"/> Census (4.4.2) <input type="checkbox"/> Tickets (4.4.3) <input type="checkbox"/> Receipts (4.4.4)	<input type="checkbox"/>	<input type="checkbox"/>
2 (optional)		<input type="checkbox"/>	<input type="checkbox"/>

Source types: Studies 4.4.1 / Census 4.4.2 / Tickets 4.4.3 / Receipts 4.4.4 / App/SDK 4.4.5 / GPS 4.4.6 / Carrier 4.4.7 / Bluetooth 4.4.8 / Wi-Fi 4.4.9 / Computer Vision 4.4.10 / Player Logs 4.4.11 / Display Logs 4.4.12

Dimension	Level
Recency (§4.3.1)	<input type="checkbox"/> Live <input type="checkbox"/> Batch <input type="checkbox"/> Seasonal <input type="checkbox"/> One-time
Granularity (§4.3.2)	<input type="checkbox"/> Atomic <input type="checkbox"/> Fine <input type="checkbox"/> Coarse <input type="checkbox"/> Constant
Coverage (§4.3.3)	<input type="checkbox"/> Deep <input type="checkbox"/> Full <input type="checkbox"/> Partial <input type="checkbox"/> None
Density (§4.3.4)	<input type="checkbox"/> High intensity <input type="checkbox"/> Low intensity <input type="checkbox"/> Low virtuality <input type="checkbox"/> High virtuality

### Inventory

Network: [network name] Displays: [number] Venue Types:  Transit  Retail  
 Outdoor  Mall  Elevator  Stadium  Airport  Hospital  Education  
 Other: Geographic Coverage: [cities/states]

## Part 4. Modeling

Studies, constants, assumptions, and formulas applied in the measurement pipeline.

### Conversion Rates (§4.2.3)

Conversion	Rate Applied
[ ] Occupancy (4.2.3.1)	[value]
[ ] Recurrence (4.2.3.2)	[value]
[ ] Visitation (4.2.3.3)	[value]
[ ] Consecution (4.2.3.4)	[value]

### Assumptions and Constants (§4.1.3.2)

Parameter	Value	Source / Basis
[e.g., Device-to-person ratio]	[value]	[e.g., Internal calibration, 2024]

### Special Studies

Study	Purpose	Date	Reference
[e.g., Calibration study — Avenida Paulista]	Visitation rate	[2024-06]	[see attached / internal report #]

This Disclosure is referenced in all campaign invoices, reports, and affidavits, establishing the declared methodology as the binding terms governing all reported metrics.

[Click here to access and download your copy of the Word template.](#)

## 5. AUTHOR



Daniel Parisien of Wherevery has more than 2 decades of experience and leadership in DOOH standards.



### 5.1 RELEVANT EXPERIENCE

These historic achievements and the author's direct involvement are relevant to his qualification to be the author of the ABOOH DOOH Metrics Standard.

#### 5.1.1 BROADSIGN ERA (2003-2015)

- First 3rd party proof of play export (Broadsign as developer)
- First 3rd party campaign performance report (Broadsign as co-designer)
- First pure-DOOH standard (OVAB as member c/o Broadsign)
- First digital compliance audit (Nielsen/Accent Health as Broadsign lead)
- First proof of play audit of a system (Arbitron/Multinetwork as Broadsign lead)
- First global digital practice (JCDecaux, Plaisir as Broadsign lead)

#### 5.1.2 WHEREVERY ERA (2015-PRESENT)

- First 3rd-party global DOOH audience standard (Quividi as author)
- First real-time API for programmatic multiplier (Quividi as designer c/o Wherevery)
- First multi-modal multi-currency DOOH data lake (RZK as inventory c/o Wherevery)

# Acknowledgments

ABOOH thanks the professionals who participated in the Metrics Committee, dedicating their time, knowledge, and expertise to the development of this document and to strengthening the Out of Home market in Brazil.

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