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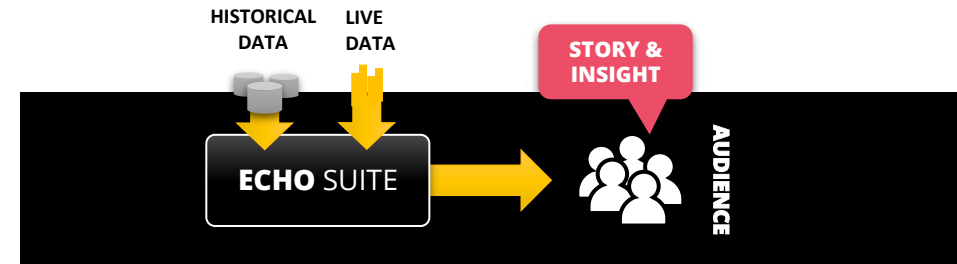
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ECHO SUITE

RESEARCH CHALLENGE AND OPPORTUNITY. Esports are video games that are played competitively by professional players and watched by over 580 million people each year. Esports are broadcast much like traditional sports, involving pre-game panels to introduce the teams, the actual match which blends “virtual camera” footage of the digital game environments with audio commentary, and in post-match segments pundits break down and analyse the match. However, compared to traditional sports, gameplay in digital games is often fast, complex and involves multiple simultaneous points of actions that cannot be easily captured all at once. At the same time, esports collect detailed tracking data about gameplay, capturing every action that takes place in the virtual arena, such as the way players move to the arena, which actions they take and what events occur. The Echo Suite of software leverages the rich data available in esports in combination with real-time analytics to break down the complexity of esports, create entirely new narratives and enable novel data-driven experiences for the esports audience.

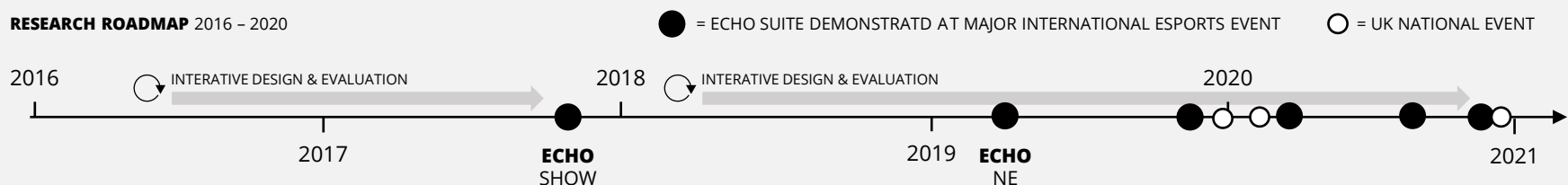
RESEARCH PROCESS. The Echo Suite of software was developed over the course of five years in close collaboration with leading companies across the creative industries, including ESL (eslgaming.com), the world’s largest independent esports company. Responding to needs from industry stakeholders to use their data in the creative process, the York-based research team engaged in a cycle of Rapid Iterative Testing and Evaluation (RITE) with key decision makers across TV, technology and product

divisions of ESL, starting in 2016. In this process, the research team designed, developed and tested the foundations of Echo Suite that uses data analytics, machine learning and artificial intelligence to “watch” thousands of historic esports matches, and use this “knowledge” to identify key highlights and extraordinary performances in an ongoing live match. Echo Suite then translates these data points into novel experiences, stories and insights for audiences.



RESEARCH PRODUCTS. Through this process of practice-as-research the team generated two major production tools, ECHO SHOW (launched at ESL ONE Hamburg 2017) and ECHO NE (Narrative Engine), which were showcased across 5 major international and three UK-wide events between 2018 and 2020 (see timeline below). ECHO NE expanded industry collaboration to also include leading companies in immersive technology, who produced several audience experiences that showcase York’s data-driven technologies (see showcase p. 4 - 5).

RESEARCH ROADMAP 2016 – 2020



ECHO SHOW

Echo SHOW is a tool that enables esports commentators to tell stories with data, delivering real-time data-driven highlights to the audience. Echo SHOW consists of two components, a real-time dashboard and a graphics generator. The dashboard identifies a range of data driven highlights about the ongoing match, giving commentators various data points that they can leverage to support their narrative, such as a record performances, key events and analysis of the virtual arena. Echo SHOW lets commentators select any highlight, generating an audience-facing graphic that shows the respective data point in a way that audiences can meaningfully interpret.



ECHO Dashboard showing data-driven infographics to the audience

Echo SHOW has been used in one large (October 2017) and three national events (November 2020, March 2020, November 2020), reaching over 25 million viewers. Evaluation of Echo SHOW found that the generated 'narrative graphics' measurably expanded the range and quality of storytelling, increased audience engagement, and invoked rich emotional response among viewers.

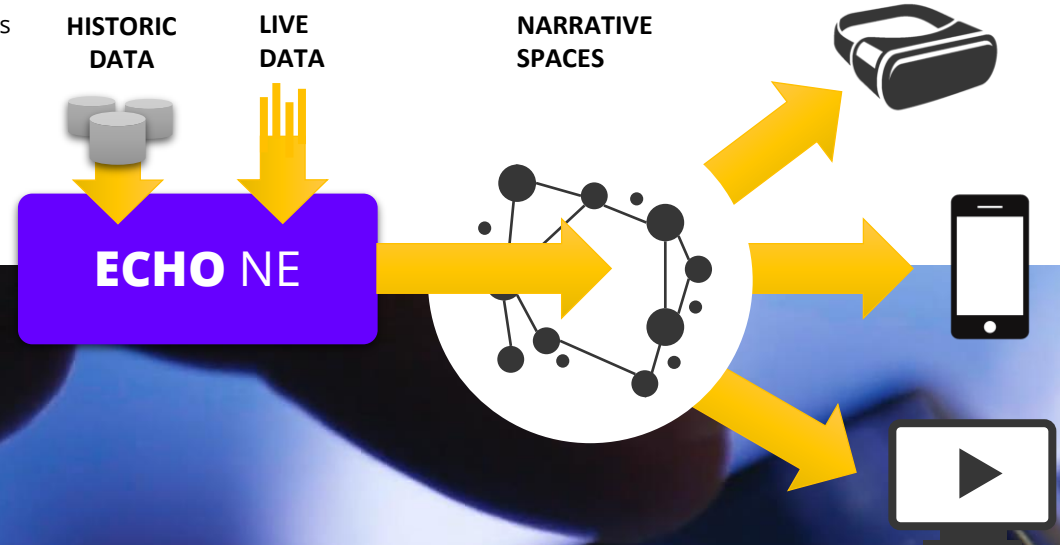


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ECHO NE

Echo NE (Narrative Engine) is an expansion of the original Echo SHOW software, creating a powerful, AI-driven content creation engine that enables entirely new ways for fans to experience live esports. Echo NE uses an advanced analytics engine to identify tens of thousands of data-points and events in a live esports match. Based on comparison with historic data, Echo NE then uses its narrative engine to translate detected highlights in a match into story arcs, visualisations and interactive analyses. The process is fully automated, enabling Echo Suite core algorithms to generate vast 'narrative spaces' comprised of many layers of analysis, interactive visualisations and parallel story threads. This, in turn, enables audience experiences that use these narrative spaces generated by the Echo Suite to create fully interactive, personalised and immersive ways for fans to engage with a live match. Most notably, Echo NE enables the generation of fully personalised experiences, in which stories, visualisations and analyses dynamically adapt to each viewer's interest and preferences. Echo NE, developed at the University of York, powers a diverse portfolio of cross-reality audience experiences

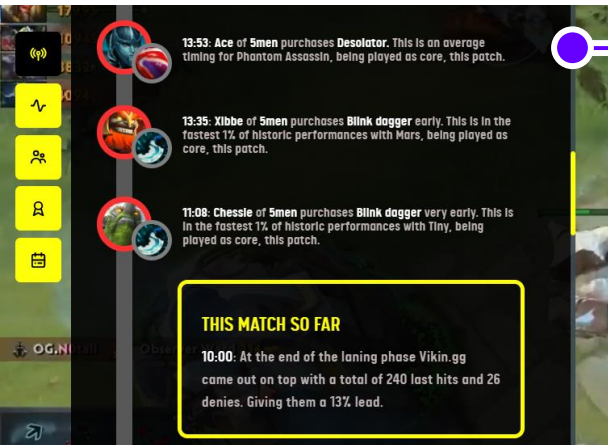
developed by Weavr's consortium partners through which the generated narrative space 'comes to live'. The following showcase, and associated video links show Echo NE in action in the context of a mobile app (developed by REWIND), interactive broadcast overlays (ESL), augmented 360 video broadcasts (Focal Point VR), virtual reality experiences (Future Visual) and virtual studio segments (Dock 10). Through this portfolio of cross-reality experiences, Echo NE was showcased at five major international esports tournaments (May 2019, October 2019, May 2020, September 2020, October 2020) as well as one UK national event (November 2020), reaching over 1.8 million unique viewers. This represented a transformation in esports audience engagement, marking a substantial shift from purely passive consumption of linear video to fully interactive, personalised and immersive ways of experiencing esports across mobile phones, augmented reality, and virtual reality.



POWERED BY

ECHO NE

SHOWCASING AUDIENCE EXPERIENCES



13:53: Ace of 5men purchases *Desolator*. This is an average timing for Phantom Assassin, being played as core, this patch.

13:35: Xibbe of 5men purchases *Blink dagger* early. This is in the fastest 1% of historic performances with Mars, being played as core, this patch.

11:08: Chessle of 5men purchases *Blink dagger* very early. This is in the fastest 1% of historic performances with Tiny, being played as core, this patch.

THIS MATCH SO FAR

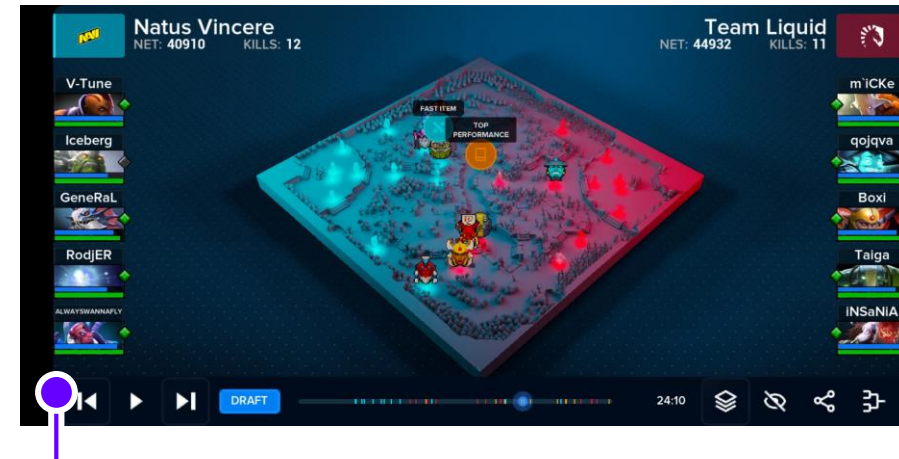
10:00: At the end of the laning phase Vikin.gg came out on top with a total of 240 last hits and 26 denies. Giving them a 13% lead.

WEAVR DOTA 2 TWITCH EXTENSION

Echo NE powers ESL's extension for the popular streaming platform Twitch. The extension adds data-driven narrative elements and infographics to the live video stream. In contrast to overlays on traditional TV, this overlays are fully interactive, letting viewers actively request information, stories and highlights that are most relevant to them. This gives viewers full control over on-demand content when they need it.



WEAVR LIVE 360 experience lets remote viewers teleport into the physical arena, using virtual reality headset. The live broadcast leverages cutting-edge, stereoscopic 8k video of the players, and features virtual overlays from Echo NE's narrative engine. The unique perspective – viewers "stand" right behind the players, gives privileged access to remote fans. The data overlay augment the experience further: floating windows give viewers more information about the performance of each player, seamlessly connecting their physical video and virtual avatars.

Natus Vincere
NET: 40910 KILLS: 12

Team Liquid
NET: 44932 KILLS: 11

V-Tune
Iceberg
GeneRaL
RodJER
ALWAYSWANNAFLY

m'iCKe
gojQva
Boxl
Talga
INSAANIA

FAST ITEM
TOP PERFORMANCE

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THE WEAVR DOTA 2 COMPANION is a mobile companion app that gives viewers in-depth statistics and personalised narratives. The mobile app, available on both iOS and Android displays the full narrative space generated by Echo NE in a highly interactive visual format. A live map shows movement of all players across the virtual arena, as well as a story feed that adopts to each users favourite team and player. Additionally, WEAVR Dota 2 Companion allows viewers to perform custom head-to-head comparisons between any two players, generating their own stories that can be shared through the built-in social media integration. Weavr Companion and the Twitch extension were together used by over 212,000 unique users over the course of three major esports tournaments in 2020.



SHOWCASING AUDIENCE EXPERIENCES

(CONTINUED)



WEAVR's VIRTUAL STUDIO SYSTEM combines cutting edge virtual studio technology with Echo NE's powerful data-driven narrative engine. This unique new combination enables commentators to be immersed in the virtual world, and weave data-driven stories with their tactical analysis.



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WEAVR VR experience creates a virtual viewing space that lets fans from all over the world get together, watch games, analyse strategy and playfully interact with each other. The map in the centre of the virtual space features all of Echo NE's narrative features. Weavr VR was used by a leading US influencer alongside some of his fans, and the interaction in the virtual environment was streamed via Twitch.tv – reaching over 222,000 viewers.



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POWERED BY

ECHO NE

RESEARCH INSIGHTS

Through co-creating Echo SHOW and Echo NE in close collaboration with industry experts and members of the audience, the York-based research team has led industry practice around data-driven creativity in esports, generating a series of insights (also see^{1,2}).

Young audiences demand new levels of control and personalisation in the way they consume content in esports. Industry stakeholders consider interactivity and personalised experiences key for retaining and growing their audience, as well as for unlocking commercial opportunities in content production.

Data-driven creative tools, pioneered by the University of York, are pivotal in responding to this demand and to capture commercial opportunities. The degree of automation brought by “creative” AI enables the generation of vast interactive and personalised experience spaces that are impossible to produce by conventional workflows. Similarly, automation also has proven to substantially increase the possibilities of coverage and production quality of smaller low-budget production.

This automation, however, does not replace the human component in content creation. Pundits have used Echo Suite to support and improve their narratives. Likewise, we have captured “data dialogs” emerging between viewers who share and discuss insights from the data space in social settings and online. The research thus shows that the interplay between human creativity and data-driven creativity creates the richest experiences.

1. Block, F., et al. Narrative Bytes: Data-Driven Content Production in Esports. In Proceedings of the 2018 ACM International Conference on Interactive Experiences for TV and Online Video (pp. 29-41)

2. Kokkinakis, et al. DAX: Data-Driven Audience Experiences in Esports. In ACM International Conference on Interactive Media Experiences (IMX '20), p. 94–105.