

UPSTART

Evaluating Upstart's Live Stream of Nine Lives from the Arcola Theatre

This report was written by Tom Mansfield in collaboration with Rebecca Kenyon and Emma Sampson. It describes Upstart's experiences delivering the live stream of *Nine Lives* and offers suggested developments and modifications for future live streams, both for *Phone Home* and for other live streaming projects on this scale.

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1: Background and Context

1. Upstart was engaged to live stream the penultimate performance of Zodwa Nyoni's play *Nine Lives* for Leeds Studio, from the Arcola Theatre, Dalston, London on Friday 29th January 2016.
2. This is a single-performer show telling the story of a gay Zimbabwean asylum seeker living in Leeds, and the stories of the people he meets. It had been touring nationally throughout 2015, performed by Lladel Bryant (LB).
3. The length of the performance, including curtain call, is approximately 1 hour.
4. The 2016 London run took place in the Arcola's Studio 2, a small, underground studio theatre which seats a maximum of 96. It is a long, narrow room, with the audience in three rows - two of bench seating, one of chairs at floor level.
5. Given the subject matter of *Nine Lives*, and Tom Mansfield's longstanding professional relationship with Alex Chisholm (AC), artistic director at Leeds Studio, this was an ideal opportunity for us to run a pilot live stream prior to *Phone Home* in the Autumn.
6. Leeds Studio were in receipt of strategic touring funding for *Nine Lives*, which they were able to use to pay for the costs of the streaming. Leeds Studio agreed to pay Upstart a fee of £1,000 for the live stream. Additionally, they agreed to pay the Arcola Theatre £150 to install a high-speed internet connection, plus backup.
7. The show was live streamed onto YouTube, which was then embedded into a page on the Phone Home website, www.phonehome.eu.

2: Technical Specifications

In order to deliver the live stream, we used the following setup:

Computer

Model MacBook Pro Retina, 13-inch, Early 2015
Processor 2.7 GHz Intel Core i5
Memory 8 GB 1867 MHz DDR3
Graphics Intel Iris Graphics 6100 1536 MB

The computer was located in the control room of Arcola 2, located on the downstage right. The operator did not have a line of sight to the performer.

Capture Cards

2x BlackMagic UltraStudio Minirecorders. These were chosen as they connected to the computer via Thunderbolt, therefore offering a high-speed solution at relatively low cost. However, Thunderbolt cables were not supplied with the capture cards, meaning they had to be bought at the fairly substantial cost of £34.99 each.

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Software

Wirecast v6.0.6, bought on a shared license with Pathos Theater, Munich.

Sound

Focusrite Scarlett 2i4, connected to the laptop via USB 2.0

Pair of over-ear **headphones** (lent by RK)

Cameras, Microphones, Cabling

Cameras: 1x Canon XF205 (DSR, operated by ES) and 1x Canon XF305 DSL (operated by RK). 2 seats were blocked off per camera. The cameras were connected to the capture cards using BNC cables, carrying an SDI-HD signal.

2x shotgun microphones (1x Sennheiser, 1x Rode). These were suspended from the lighting rig as drop mics and connected using XLR cables directly to the Focusrite sound card.

No **mixing desk** was used - this had implications for the quality of sound.

3: Client Requirements

1. Leeds Studio's priority was to ensure the experience of the **live audience** in the theatre. The two cameras were therefore positioned in the auditorium, on either end of the long axis of the seating. This allowed us to maximise coverage, so that LB was always in sight of both cameras, without obstructing audience view. From both camera positions, if the camera was on a wide shot the audience would always be in view.
2. **Marketing** was deliberately kept low-key as this was an experiment for the Upstart team and Leeds Studio wished to maximise ticket sales in the theatre. The number of people watching was expected in advance to be low.
3. As well as live streaming, a live **recording** was made directly onto the computer for Leeds Studio to be able to pass to potential bookers and funders.
4. For rights reasons, we were forbidden to keep an archive recording on line other than as a private link to pass to funders and other interested parties.

4: Staffing

The live stream team comprised the following three people:

1. Rebecca Kenyon - camera 1 operator (DSL)
2. Elvis Shabani - camera 2 operator (DSR)
3. Tom Mansfield – Wirecast operator / live stream director

5: Audience metrics

1. Google Analytics embedded in the YouTube video platform allow us to gather a number of statistics about audience behaviour.
2. The stream was played a total of 79 times during the period it was live. These were overwhelmingly in the UK, with 4 playbacks from Germany, 4 from Sweden and 2 from South Africa.
3. The analytics data also tracks 'peak concurrent viewers' - the number of people watching a given video at the same time. While not necessarily representing the 'true' audience number (as person A may watch for a time, then person B start watching) this is possibly a more accurate audience figure.
4. Peak concurrent viewers were 42 UK, 2 in Sweden, and 1 each in South Africa and Germany.

Playbacks	Peak concurrent viewers	Total view time (hours)	Average session length (minutes)	
79	44	24.34166666667	18.4873417722	
Country	Germany	UK	Sweden	South Africa
Playbacks	4	69	4	2
Peak concurrent viewers	1	42	2	1
Total view time (hours)	0.9666666666667	22.74166666667	0.53333333333333	
Average session length (minutes)	14.5	19.7753623188	8	3

5. The average 'session length' was 18.5 minutes. We do not have a detailed breakdown of these numbers but this implies that some people may have watched for a couple of minutes while others watched all the way through.
6. A more useful way of tracking audience numbers may be 'unique users', as below. We know that in some instances more than one person may have been watching for each device. However, these numbers suggest that approximately 45 people played the livestream on their device.

Region	Views	Unique users
DE	4	1
GB	73	42
SE	4	2
ZA	2	2

7. Given the disparity between playbacks and peak viewer numbers, it's possible that many audience members watched for a short time then either stopped watching or needed to refresh the stream.

8. According to Google Analytics, the majority of watches (64) came from the embedded player on the Phone Home website. 19 watches came from 'other' sources, predominantly in the UK.
9. As seen below, these sources include Google and YouTube searches, direct visits to the Upstart YouTube channel, and referrals from other YouTube videos including the cancelled stream from earlier in the evening.

Region	Source type	Detail	Referred views
DE	YT_OTHER_PAGE	youtu.be	1
DE	EXT_URL	phonehome.eu	3
GB	NO_LINK_OTHER	unknown	2
GB	SUBSCRIBER	my-history	1
GB	YT_CHANNEL	UCvI_q5tWjf_HCkgd6ttOsZg	4
GB	YT_SEARCH	nine lives arcola	1
GB	YT_SEARCH	nine lives live from arcola	1
GB	YT_SEARCH	nine lives live from arcola theatre	1
GB	RELATED_VIDEO	JkLTW2Q8KDA	3
GB	RELATED_VIDEO	ZRRxYKNg0Qo	1
GB	RELATED_VIDEO	unknown	5
GB	YT_OTHER_PAGE	unknown	1
GB	YT_OTHER_PAGE	youtu.be	1
GB	EXT_URL	Google	1
GB	EXT_URL	phonehome.eu	51
SE	EXT_URL	phonehome.eu	4
ZA	EXT_URL	phonehome.eu	2

10. Google Analytics provides information as to the gender and age breakdown of viewers (this only applies to viewers with Google accounts). Although the sample size is small, the figures suggest that our audience is predominantly young (under 35 year olds making approximately 50% of our viewers) which perhaps reflects the use of digital technology. However, significantly more information would be needed in order to draw substantive concerns about demographics.

FEMALE	18-24	3.1%
FEMALE	25-34	34.4%
FEMALE	35-44	6.3%
FEMALE	55-64	3.1%
MALE	25-34	9.4%

MALE	35-44	25%
MALE	45-54	18.8%

6: Narrative of Stream from Upstart's perspective

1. The Upstart team of TM, RK and ES had planned to meet at the Arcola at 3pm to discuss plans for the day, with a rehearsal call for LB and stage manager Emmaleigh Pightling (EP) taking place at 4pm. We had previously arranged with Arcola staff for the high speed internet to be installed.
2. At 11.04am TM received an email from Nick Cripps, software developer at the Arcola who was responsible for setting up the internet connection in Studio 2, saying that he was sick and a colleague would be organising the setup.
3. We arrived at the theatre slightly late at approximately 3.15pm. We were able to gain access to the studio immediately and began setting up camera positions and cabling. LB and EP were ready to work at 4pm.
4. The Arcola staff member deputising for Nick arrived in the space at 4. At this point we hit our first major problem of the day. The internet connection had not been set up and the staff member did not know where the cable entered the studio. This took a long time to resolve. It was 6.30pm before we had a working high-speed internet connection.
5. Getting the cameras set up was a relatively smooth process. However, one initial challenge was in making sure the video settings matched the input required for the camera. We initially tried matching the setting to what was needed for Wirecast/YouTube i.e. 1280x720 for better playback and sound sync, but because ES's camera DSR (XF205) wasn't readable on this resolution setting and a couple of additional variations in menu options between the different models of camera, we had both cameras set to 1920x1080 (resolution) 25P (frame rate), 35 Mbps (bit rate). Both were on SD with SDI output.
6. Due to the delays in getting the Internet set up and connecting the video to the cameras, we were unable to run a full camera rehearsal prior to the performance. We knew that the stream would therefore have an improvisatory approach to shot timings etc.
7. We were, however, able to run a test stream prior to the show, and the quality of the video appeared good.
8. We had advertised that the stream would begin at 7:50pm, 10 minutes prior to the start of the show. In order to make sure that we were up and running by then, TM started the livestream early at approximately 7:35pm.
9. At approximately 7:45, that initial live-stream had to be aborted as we were no longer connected to the Internet. Investigation by Arcola duty technician revealed that the resident IT technician had come into work following his day off sick to discover that the Internet had gone down throughout the building,

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including Box Office computers, because the main internet connection had been unplugged in order to plug in the cable for our high-speed connection. He had therefore unplugged our connection in order to re-establish the connection for the rest of the building.

10. The connection to our venue was re-established by the 8:00 start for the performance. However, because the original live-stream had been stopped on YouTube, the software would not allow us to restart the existing connection. TM therefore had to go through the following steps before our online audience was able to reconnect:
 - Set up a new live stream on YouTube;
 - Set up that live stream on Wirecast (it is also possible to set a stream up in Wirecast and then add details on YouTube);
 - Start the new stream on Wirecast;
 - Start the new stream on YouTube;
 - Copy the embed code from the YouTube page to www.phonehome.eu;
 - Keep contact with the audience on Twitter in order to advise people to refresh their page.
11. By the time this process was completed, and we were able to give clearance to Front of House, it was approximately 8:10.
12. At the beginning of the livestream, CPU usage on Wirecast was extremely high, varying from 98% to 100%. Approximately 10 minutes into the stream, the CPU usage seemed to stabilise at approximately 80%. At this stage we don't have an explanation for this; however, it is a good argument for starting the stream ahead of the advertised start time for performances.
13. Given the lack of time in rehearsal and the chaotic start to the stream, plus the lack of communications, running and operating the stream became a more 'seat-of-the-pants' experience than we had anticipated. In the circumstances, both we and Leeds Studio were pleased with the creative output from the stream.

7: Audience Experience

1. Audience feedback was gathered through conversations with friends and colleagues who had watched the livestream, and through a survey designed by Emma Sampson.
2. Having spoken with a number of people who had watched the stream in the UK, and one in Germany, **opinions and experiences differed substantially**. Audience members watched on a wide range of devices, from phones to televisions, and will inevitably have been watching over different home connections.
3. Some audience members reported that the **video quality** was quite grainy; others, including one who was watching on an HD TV, said that the video quality was good.
4. Some people reported problems with **sound**; others said they could hear everything very clearly. Anecdotally, those who found the sound experience to be

clear tended to be from Yorkshire, where LB comes from. It may be that these audience members found it easier to hear because they were more familiar with the accents used in the performance (the quickest parts of the performance were in a thick Leeds accent). The sound was not found to be directional, and there were problems balancing the performer's speech with the sound design. Some actions which might help develop sound are:

1. Improve directional sound through using **mixing equipment**;
 2. provide **advice for audiences** through e.g. using headphones.
 3. **Subtitles** would also be an option, although they may be prohibitive in terms of cost.
5. Some audience members said they found **watching the audience** distracting; others said they enjoyed it as it made them feel part of the live event.
6. While the broad range of opinions makes it difficult to form a coherent view of the audience experience, it seems clear at this stage that we did not achieve universal success. Several of the people who enjoyed watching the stream said the thing they liked the most was the fact that the technology existed at all. While this is of course a good thing, it doesn't seem to go nearly far enough in terms of creating an experience that engages, delights and challenges an audience in a comparable way to watching the show in the theatre.
7. In future, including for Phone Home, it would be helpful to gather **evaluative responses** from the audience in order to develop the experience. We might ask about:
- Their affective response to the creative elements of the show;
 - Their experience of sound and video quality;
 - How they heard about the stream;
 - Whether they have seen Phone Home live;
 - Whether they would now consider going to see the show live.

8: Communications with the livestream team

1. We had planned to use the team's personal smartphones and Google Hangouts to communicate during the stream. Because ES and RK were in the auditorium, communication was intended to be one-way except in an emergency. TM would have been able to inform the operators which camera was live and, where necessary, to ask them to change their zoom or other settings.
2. However, once the livestream started we noticed that the CPU usage in Wirecast increased substantially when Google Hangouts was activated on the computer.
3. In the circumstances, TM took the decision to abort the Google Hangout. Immediately the CPU usage moved to a lower level. However, this meant that we were unable to communicate during the broadcasts. This had several knock-on effects:
 1. Primarily, the team had to shoot 'as live', limiting our creative opportunities in terms of shot selection, zoom etc.
 2. It was impossible to correct white balance during the performance as operators did not know which camera was live.

3. Errors took longer to correct as the operators had to proceed slowly to avoid jerking the shot if their camera was live.
4. For future live streams, including Phone Home, it would be good to invest in some **communications technology**, either wired or radio, that does not rely on the Internet and will not impact on either bandwidth or processor use.

9: Communications with the online audience

1. A Twitter hashtag had been distributed in advance of the event and widge-tised on the relevant Phone Home web page, so that non-Twitter users could still receive information that way.
2. However, when problems started to occur TM was occupied with setting up the new pages and unable to immediately tweet to the audience, meaning that we received a number of tweets from the online audience asking what was going on.
3. Since no comms were available within the team, RK or ES were also not able to communicate with the audience (and even if we had been able to communicate, they were not set up on Upstart's Twitter feed, though they could have tweeted from their own accounts).
4. There was also no way of responding to audience feedback during the performance since TM was occupied with shot selection.
5. It's worth considering whether we need an **additional team member** in the control room who is not responsible for operating the live stream, but can focus on managing the relationship with the audience and dealing with problems as they arise.
6. Most posts from audience members were made either at the beginning of the stream, with audience members communicating with us that they were having a problem with the stream; or at the end of the performance with people tweeting a response to what they'd just seen. Comments on the show were very positive ('I could probably read 100 books on [#migration](#) & [#LGBT](#) and still not feel as moved as I did just now'; Watched incredibly moving & thought-provoking [#NineLivesLeeds](#) [@lladelbryant](#) is sensational.)
7. One user tweeted a couple of lines that stood out for her as the performance went along.
8. **Expanding the role of social media** in the stream would be a helpful way of developing audience engagement. This would require a member of the team to be communicating on Upstart/Phone Home's behalf during the broadcast, using a clearly advertised social media forum or a bespoke system.

10: Using Wirecast

1. Throughout the process, Wirecast was simple and effective to use, allowing us to switch between the two cameras easily, as well as to add it title cards and credit sequences.
2. Broadly speaking, it seems that cutting between the two shots was more effective than the more gradual transitions.
3. When working with Wirecast in future, we could take more advantage of the software through, for example, incorporating Twitter responses into streams.
4. We would recommend Wirecast for future live stream projects.

11: Lessons Learned

1. From Upstart's point of view, *Nine Lives* was an **ideal opportunity to test out the technology and processes used to deliver a successful live stream**. Broadly speaking, it was a creative success, allowing the production to reach a significant number of audience members who might not otherwise have been able to see the production.
2. Moving forward, Upstart will need to consider two the lessons learned under two headings:
 1. How to integrate live streaming into *Phone Home*, and;
 2. How to deliver more effective *live streams of other productions*, which might not have live streaming built into their model.
3. However, many of the lessons learned from the *Nine Lives* experience are applicable to both of these models.

Artistic Lessons

4. In the *Nine Lives* stream, although the team were familiar with the production, there was **no opportunity for camera rehearsals**, which meant that shot selection was imperfect.
5. For *Phone Home*, **video should be integrated into the rehearsal process from the earliest possible moment**, both in terms of camera positions and shot selection in Wirecast;
6. As well as planning out these choices, we should **record and/or live stream to a private channel** throughout the rehearsal process – essentially, considering the production as much as a **digital video project** as a representation of live theatre.
7. For *other live streams*, we should endeavour to **rehearse as much as possible**. NESTA has produced a very useful [report on NT Live](#) which describes a model well worth exploring - beginning with rehearsals using a static camera and then running at least 2 camera rehearsals of the full production. While this would have an impact on the budgets for each live stream, it would be likely to substantially increase the quality of the output.

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8. We need to be able to make the best use of the **language of the camera**. One of the limitations of the *Nine Lives* stream was that the cameras were locked in static positions. If we want to maximise the creative power of the camera in order to tell our stories, then the camera needs to be able to move - both in terms of well-planned use of **zoom, close-up etc**, and in **physically moving the camera**. This would apply regardless of what type of camera we were using.
9. In turn, this means we need to find ways to **allow the camera operators to appear on stage** so that they become part of the live performance rather than separate from it. This leads us to a related issue regarding **audience buy-in** (see below).
10. **Communications** between the vision mixer and camera operators is paramount - operators need to know whether or not their camera is live in order to make effective adjustments.

Audience Relationships

11. One of the key elements explored in the Nesta report on NT Live is **the way in which the audience in the theatre respond to the specialness of the event**. For *Phone Home*, this will be built in to the nature of the production; for other live stream events, it needs to be established.
12. On *Phone Home* we need to think about **how to build the relationships between the live audiences in Munich, Athens and London, and the (potentially worldwide) digital audience**, from the earliest stages of development. What are the engaging and creative ways we can establish those relationships? Are there ways of doing this which enhance the stories we tell in the production? This is a key question for the Munich workshop. Some possibilities might include:
 1. A **'handshake' sequence at the beginning of the show** in which we establish the relationship between the three theatres, e.g. with actors talking to one another etc, audiences waving at one another etc;
 2. Putting **moments of contact with the digital audience** on stage, for example through making a **'Wall of Social'** part of the performance. Another way of describing this would be **finding a digital dramaturgy**.
 3. Extending the contact between live and digital audiences through to **post-performance discussions**; e.g. running a single discussion across the three theatres, or taking questions from Twitter as well as from the live audience.
 4. **Live-blogging or live-tweeting** one or more performances.
 5. Creating short pieces of **digital-only content** for audience members who may not have been able to watch live.
13. For *other livestreams*, audience buy-in could be achieved in a number of ways, including but not limited to:
 1. Announcement of the livestream at point of ticket purchase;
 2. Offering free or discounted tickets for this performance;
 3. A pre-show announcement from the venue, company or Upstart.

4. For the online audience, building ways of them relating to the show into pre-show sequences e.g. through Wall of Social projected onto the back wall.
14. More broadly, the **relationship** between the digital audience and the show needs to be **managed by a single designated individual during each performance**. If a feed goes down, this individual needs to be able to tweet that immediately to our followers; this therefore **cannot be done by the same person who's operating Wirecast**.
15. Finally, providing opportunities for the digital audience to **evaluate the digital platform immediately after the show** - in a similar way to what happens at the end of a Skype call - will allow us to rapidly build a picture of how a performance has gone. Emma Sampson prepared one of these forms for the *Nine Lives* broadcast, but it was not distributed till several weeks after the stream. In the context of an ongoing run, immediate feedback will be invaluable.
16. We should **give the audience advice** on how best to experience the show digitally - i.e. is it best watched on a laptop, smartphone, digital TV, with headphones, speakers etc.

Technical Requirements

17. The **high speed connection MUST be up and running** by the time the team arrives on site for any broadcast. This caused us massive loss of time on the *Nine Lives* broadcast and in other situations could have been catastrophic.
18. In terms of **sound** we need an additional **mixing desk** and potentially **individual microphones** for the performers in order to use the language of sound and voice to its fullest potential.
19. **Lighting** must be designed with sensitivity to the aesthetics both for the live and online audience; on *Nine Lives* one of the camera positions tended to appear as very dark in all states.

12: Conclusion

While the *Nine Lives* stream was challenging in a number of ways, overall it was a success. Leeds Studio enlarged their audience reach and generated a record of their production; Upstart had the opportunity to test the technology and setup that we can use in future live streaming projects. From Upstart's perspective this is useful both for the development of the *Phone Home* project and in proving the artistic, logistical and financial case for planning future live streams.

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