



Introduction

Production Design and Visualization is a research project managed by Stageport Ltd, with financial support from Creative Scotland and The Royal Society of Edinburgh. The project ran from April 2019 to December 2019.

Stageport Background

Stageport are a Scottish company founded in 2018 by Stephen Roe.

Stageport's aim is to build a comprehensive database of virtual venues that provide a number of downstream benefits:

- Venue staff can access and share detailed information about the facilities they manage. (Building Information Management)
- Venues can share enhanced access information with audiences and offer virtual tours to clients.
- Producers can visualize designs within each venue and share information with production teams.

Since 2018, Stageport has built a network of co investigators and we have received funding from The Royal Society of Edinburgh, Creative Scotland, Edinburgh University, Edinburgh International Festival, Scottish Futures Trust and The Royal Conservatoire of Scotland.

Project Background

The initial aim of the project was to visualize a new theatre production in a virtual venue and explore what benefits this could bring in terms of design delivery, production management, and audience engagement.

The project also aimed to investigate what content emerges when creative teams developing a new show engage with technology normally geared towards creating immersive experiences.

Initial Stages

At the outset of the project we began with a number of key questions that shaped the initial conversations with Tramway, NTS, Soluis and Spectrum Heritage:

- What are the costs and benefits of capturing and modelling venues using digital surveying technology?
- What are the costs and benefits of capturing and digitally modelling production design content?
- How can producers and venues best exploit this technology?
- What content relevant to the theatre sector could be viewed in immersive formats? For example: preview content and performance archives.

After initial workshops, the project focused on the following objectives.

- Digitally survey and model Tramway Theatre
- Develop a 3D digital environment that reflected the design of a new production by National Theatre of Scotland
- Investigate how the resulting digital models and virtual tours could be used by producers to improve production design & planning
- Investigate how the digital models and virtual tours can be used to provide enhanced access information to audiences.
- Investigate how the 3D design content and virtual tours could provide new audience engagement opportunities.

The following report is an overview of how the project unfolded.

Stageport thanks NTS and Tramway for their valuable contribution and thanks our project partners Soluis and Spectrum Heritage for sharing their knowledge and experience as the project progressed.

Production Design and Visualization 2019

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Executive Summary

The project had two main objectives:

- Digitally survey and model Tramway Theatre and investigate how the resulting digital models and virtual tours could improve production design & planning and provide enhanced access information to audiences.
- Develop a 3D digital environment that reflected the design of a new production by National Theatre of Scotland and investigate how this content could be published to provide new audience engagement opportunities.

Underlying Questions

- Does a digital survey create enough benefit to justify the cost?
- Can 3D digital environments improve production design and planning?
- How can artistic teams effectively engage with digital designers to generate preview and archive content?
- What benefits does this digital content provide to producers and audiences compared to current outputs?
- Does this content provide sufficient benefits to justify the investment in skills and technology?
- What are the foreseeable IP and licensing implications for producers and designers when digital archives are published?
- How can producers create value from digital content?

Our Observations

Digital Surveying

- Digitally surveying venues creates valuable CAD, 3D and virtual tours with a range of downstream benefits for venues and audiences.
- Digitally surveying venues does not have a significant impact on the artistic process.
- Digitally surveying venues allows better risk assessment of set designs at earlier stages of the artistic process and can improve technical planning.

Digital Design

- Designers and creative teams are concerned that digitising their work risks devaluing the artistic process and makes plagiarism more likely.
- Publishing digital content to drive sales, needs to be balanced with maintaining the integrity of the artistic process, and protecting the relationship between artists and producers.
- Digitally archiving productions is an easier point of entry for the sector compared to publishing preview content.
- In the event that digital archives are widely adopted in future, IP and Licensing agreements between publishers, designers and producers will need revised

Main Motivation for The Project

Performing arts organisations face significant barriers to digital innovation such as cost, time, knowledge and finance.

This project aimed to break down these barriers through high quality collaborative work to investigate the value of adopting a more digital approach to production design and visualization.

As the discovery process progressed, the project also focused on the relationship between digital content and data, and how producers can create value from the data this content generates.

Engage New Audiences

Figures published by UK Theatre and SOLT in 2018 illustrated that average attendances at UK venues averaged 61% of seats available. The report goes on to highlight the more complex picture facing the arts, with attendances ranging from 66% at large scale producing houses down to 48% at mid-scale presenting houses.

In this context, the project aimed to develop digital content that producers and programmers at every scale could use to engage with new audiences and increase revenue from ticket sales.

Build New Connections

Like every other sector, the arts must adapt to rapidly evolving digital technology and learn to exploit the opportunities presented by increased connectivity.

In 2018, Innovate UK published a report into the emerging immersive economy which outlined the main barriers to growth. These barriers included: lack of ecosystems that can support innovation, limited access to skills and knowledge, lack of finance and uncertainty about investing in skill sets and tools.

Using the key findings of the Innovate UK report, we aimed to remove barriers, establish an ecosystem of skilled practitioners, provide finance and ensure we had the knowledge and skills on our team.

Return On Investment

Staging performances is an expensive business with ever increasing up-front costs.

Creative Scotland's Review of Touring in 2017 stated that increasing touring costs had resulted in shorter tours and reduced cast sizes resulting in a decline of mid-scale touring shows.

The project aimed to understand how producers can create additional value and extend audience engagement from digital archives and online experiences linked to their live shows.

We aimed to de-risk the innovation process and help create digital content that our producer could use to engage audiences in advance and provide archive and legacy material long after the show had come down.

Project Partners

Soluis.

Digital design agency based in Glasgow and London.

<https://www.soluis.com/>

Represented by Steve Colmer.

Soluis worked with NTS designer Nick Millar to develop a set of digital assets that mirrored the production's design concept, with the aim of creating a library of 3D content that NTS could use for audience development, marketing and archiving.

Stageport.

Digital surveying and project management.

<http://www.stageport.co.uk>

Represented by Stephen Roe

Stageport conducted a digital survey of Tramway Theatre to develop digital assets that can be used by Tramway and by visiting companies for tour planning, design delivery, venue management and audience development.

Spectrum Heritage

Photogrammetry and 3D visualization specialists.

<https://spectrum3ds.co.uk/>

Represented by Clara Molina Sanchez

Spectrum captured the designers model box and hosted a workshop to demonstrate how photogrammetry can assist designers and producers to create digital archives and host them online.

National Theatre of Scotland.

Producer of the production "Them!"

Creative team: Pamela Carter, Stewart Lang and designer Nick Millar.

Technical Team: Gemma Swallow, Graham Coyle.

NTS gave us access to their design process, provided valuable feedback about the aims and objectives of the project and contributed to the review.

Tramway

Receiving Venue.

Technical Manager: Paul Sorley.

Tramway gave us full access to the venue and have contributed to the development of the digital assets that they aim to publish the content in due course.

Introduction to the technology

Digital Surveying

Is the measurement of a building, captured by a laser scanner, to produce a dense collection of 3D points, with accurate XYZ coordinates known as a point cloud.

The point cloud can then be used for spatial analysis, or to create further outputs such as detailed 2D drawings, accurate 3D models or used for Building Information Modelling (BIM).

In this instance, we used laser scanning equipment, provided by Leica Geo-systems, to capture Tramway Theatre and create models and virtual tours that can be used for pre-visualization by producers, designers and audiences.

Photogrammetry

Is a fast and cost-effective way of carrying out the 3D documentation of objects, buildings and surfaces using photographs to create 3D models.

Cultural heritage organisations use photogrammetry to produce digital replicas of historical artefacts for conservation, analysis and research. and for dissemination to audiences through animations, renders and web viewers.

Photogrammetry ensures the precise reproduction of a subject's texture and colour, whereas laser scanning ensures geometrical accuracy.

In this instance, we captured the designers 1: 25mm model box and hosted a one-day photogrammetry workshop with industry colleagues.

Digital Design

3D design in a software package like 3D Max allows the creation of assets that can be use used and published in a variety of ways.

These assets can be created from drawings, photographs, reference sketches or physical models. These assets can be textured and lit to mimic real world environments.

CGI and animation can be created from within the software to show journeys or different setups. 3D Max can also be a gateway to creating a Real Time Environment model via Games Engine solutions such as Unity and Unreal.”

In this instance: Soluis used 3D studio max to interpret NTS design references and build a 3D scene NTS could use to publish renders, video and interactive 3D content

Scope

The project involved a high level, first pass over three main technology strands: Photogrammetry, Digital Surveying and Digital Design.

The project team aimed to identify the relationships and barriers between production design & digital design, and to identify how digital surveying and photogrammetry can improve production planning and audience development.

The scope of work for each strand was:

Digital Design

Develop 3D digital environments from design references provided by Nick Millar and create content that NTS could use for audience engagement.

Photogrammetry

Capture a digital copy of the model box and incorporate the model into the digital design process and make a version available to the producer for online audience engagement.

Deliver a photogrammetry workshop to illustrate how the photogrammetry process can be used to develop digital archives and portfolios.

Digital Surveying

Capture Tramway using lidar scanning technology and develop accurate models,

Cad and visualizations that:

1. Help visiting companies with tour planning and design delivery.
2. Help venue staff to manage operations and maintenance.
3. Help audiences plan their visit to the space, highlighting any access facilities and providing other relevant information.

Digital Outputs

Over the course of 8 months, the team engaged with NTS and Tramway to produce the following outputs.

Digital Design

Production renders.

3D environment.

Video archive.

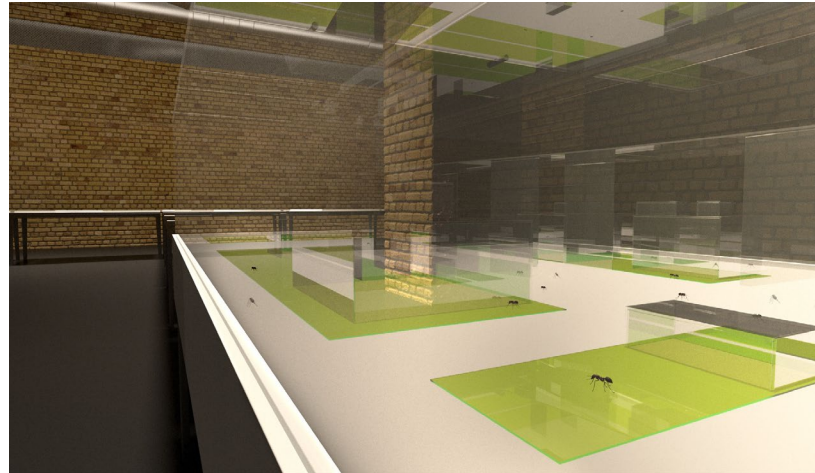
Game engine export.



Photogrammetry Team

Digital archive.

Online model

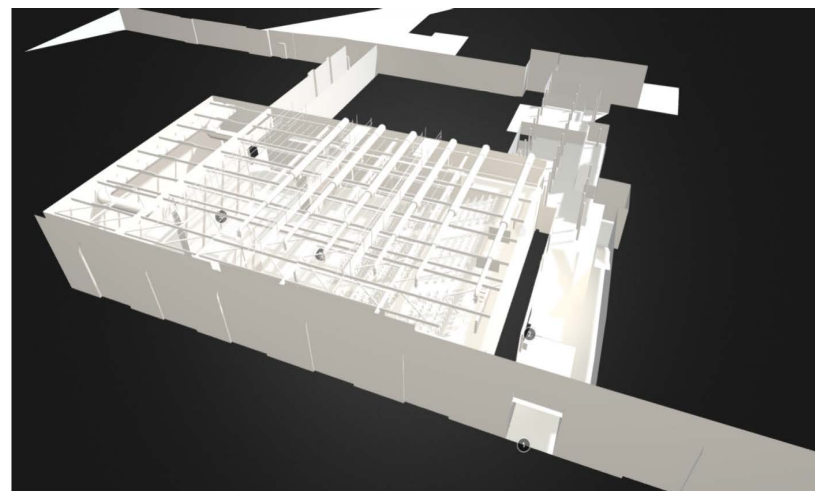


Digital Survey Team

Point cloud.

3D model.

Cad.



Barriers to Innovation

Contracts & Licensing.

Stageport commissioned contracts from Cloch Solicitors, outlining how intellectual property would be licensed by each party.

The contracts were primarily to ensure Stageport had perpetual, non-exclusive rights to publish the research, but also to highlight how IP is perceived by the designer / producer / design agency and subcontractors.

Contracts were issued to Nick Miller, NTS, Tramway, Soluis, Spectrum Heritage and DotSan Deign. No contracts were returned by NTS or Tramway.

NTS were uncertain about how the IP arrangements affected the agreements they already had in place with their creative team.

Tramway reported that Glasgow Life were uncertain about licensing their venue data without further investigation.

Our recommendation for any future projects is that a set of simpler contract templates are produced based on more detailed feedback from NTS and Glasgow life.

Engagement & Time management.

The initial project schedule was for 6 months work starting April 1st and concluding end of September 2019.

In reality, the schedule slipped to October due to engagement and availability issues out of Stageport's control.

Initial deadlines and final deadlines are as follows:

Photogrammetry content deadline 27th May. Final Delivery date: 27th

May. Digital design content deadline 27th May. Final Delivery date.

2nd October.

Digital survey and venue model deadline 24th June. Final Delivery Date.

2nd October (with work still in development)

Publishing digital design content.

Stageport aimed to publish the Soluis content in early June through NTS marketing channels, to engage audiences attending performance of Them!

We offered to publish the content in two ways.

1. Online, through social media and NTS web site.
2. On an interactive screen in the Tramway foyer.

We met with NTS and Soluis on 30th May to agree deliverables and finalise the 3D scenes Soluis had built.

Following the meeting between NTS and Soluis, NTS decided not to publish any preview content in the foyer or online but offered to assist Stageport to publish an illustrative article about the process on NTS website in July.

The decision not to publish any preview content was taken by NTS after consultation with the artistic team who were still going through the artistic process.

This was disappointing, given that we had hoped to collect audience feedback in real time.

What we have now is a retrospective of the project, and a collection of digital content worth evaluating with NTS and other interested parties.

Stageport would like to publish & present a version of this report along with the content we commissioned and engage further with NTS, The Envelope Room and a wider network of designers and producers.

Publishing Photogrammetry content

Stageport aim to publish the photogrammetry models with some useful resources that explain the process, costs, benefits and risks on Sketchfab, and promote the article through NTS and Stageport channels.

Stageport have previously published articles here, and it's a good medium to reach a wide audience.

We also captured feedback from the participants of the photogrammetry workshop that we would like to share in future presentations to give a broader perspective and stimulate conversation.

Key questions that emerge are:

Can photogrammetry provide a cost effective way for producers to share digital archives with audiences?

What value do these digital archives unlock?

How should this content be licensed?

Publishing Tramway Content

Stageport aimed to publish 3D, Cad and PDF plans of Tramway in September 2019. The content was aimed at three main audiences.

1. Visiting artists and touring companies, for production planning and design delivery.
2. Tramway staff, for operations.
3. General public, for access information.

Following the successful capture and modeling of the data we anticipated further engagement with Tramway before publishing the results.

Unfortunately, Tramway engagement tailed off due to concerns at Glasgow Life about IP and licensing the scan data, and uncertainty about the security risks of sharing detailed models of the building online.

In November, Stageport presented the results to Scottish Futures Trust, a Scottish government body established to improve public infrastructure investment.

SFT are leading the conversation in Scotland about Building Information Modelling (BIM) and have a wealth of expertise in digital documentation.

Stageport argued that digitally documenting Scotland's cultural estate could provide wide reaching benefits including:

1. Accurate digital records of Scotland's cultural estate.
2. More efficient operation of venues.
3. Better information exchange with visiting companies and suppliers.
4. Better engagement with the general public.

In January, SFT approached Creative Scotland and Glasgow Life about extending the Tramway research and commissioned Stageport to consultant on a project that built on the work we completed in 2019.

In February and March 2020, SFT, Stageport and Tramway worked with Multi Vista, a Scottish digital documentation company based in Glasgow, to develop additional digital assets that Tramway could host and manage.

This project was due to be published in April but is currently delayed while the Covid 19 shutdown is in place.

Further Developments

The project provided Stageport with valuable insights into the innovation process and highlighted the challenges that producers face as they develop their digital strategies.

We learned that producers face a difficult balance between publishing preview content to engage new audiences while maintaining the integrity of the artistic teams work, and that even as new digital formats emerge, such as immersive content and interactive displays, there are still significant barriers to innovation linked to the traditional creative process.

The opportunity to work with NTS and Soluis provided Stageport with knowledge and experience that we have used to drive forward new innovation projects in 2020

In January we began an Innovation Demonstrator at The Royal Conservatoire of Scotland that built on the foundations established here.

Stageport worked with RCS and ISO Design to digitally document the production of a main scale Opera at RCS.

ISO were commissioned to design an interactive digital display that audiences attending the performance could access in the foyer.

The display would present design preferences, construction work and rehearsal content in digital formats such as 3D sketch books and costume designs, animated scripts and scores and a portfolio of video and photographic content that illustrated the work that had gone into the Opera.

Unfortunately, The Covid lock down, halted the project on the 20th March but we are aiming to revive the project at a later date.

Data Driven Innovation.

A main focus for Stageport when we shaped the RCS project was determining what data could be collected from audiences who accessed the digital content.

From analytics built into the display, to direct feedback from audiences about the performance, the data could provide valuable information that producers could use to develop their digital strategies and design future innovations.

In December 2019 Stageport approached the Creative Informatics program at Edinburgh University about the work and we secured a £12k resident entrepreneur award to develop our knowledge about data driven innovation and in March we successfully responded to a Creative Informatics challenge project posted by Edinburgh International Festival that secured Stageport an additional £20k of funding that builds on the work we have done with Scottish Futures Trust and Tramway Theatre.

Recommendations

Preview, Archive and Legacy

The project initially aimed to develop preview content that the producer could use to engage audiences and sell tickets.

Our approach was to work alongside the creative team to generate content from the existing design references, such as the model box, video design and construction references.

The main barriers we faced were:

1. Time management.

Once the production was in full swing NTS had little time to engage with us, and we missed their input at key stages of the digital design process.

2. Artistic values.

The creative team were not comfortable sharing preview content with audiences while the artistic process was still underway.

Our recommendation for future projects is to focus on developing digital **archives** and take a longer term view of how digital archives can engage audiences.

By establishing good digital documentation practice during the production process, it is relatively easy to interpret these materials and create interactive digital archives.

Digital archives create opportunities for audiences to access and learn about a producer's previous work that could be released in a more managed way. For example: A season launch could also include digital archives from a previous season's performances and soon.

Once the language of digital archiving is more established, we predict that producers will be more open to preview content in future.

Digital Venues

Conducting a digital survey of a building creates a valuable asset that can provide a wide range of down stream digital resources.

Using data from the survey it's possible to generate accurate CAD and Online models in multiple formats that can be distributed to visiting companies.

The survey also provides virtual tours that vastly improve on the quality of accessibility information currently shared with audiences.

Venues can use the assets for business development, audience engagement, operational activity and facilities management.

Visiting companies can use the assets for technical planning, design delivery, risk assessment and communication with suppliers.

Recommendations

To fully understand the sector wide benefits of digitally twinning venues, there needs to be a wider sample of data captured at main scale, mid-scale and small-scale venues, with training and support provided to end users.

Addressing the concerns expressed by Tramway about data security, ownership and IP, its essential to identify or create an information management system that allows venues to control and manage the data they own.

With the additional funding provided by Scottish Futures Trust, Tramway have the opportunity to host and manage their digital assets over a three-year period. It's essential that Tramway are supported to record their experience and that there is a framework in place for the review to be shared widely at a later date.

Concluding Remarks

Approach to Innovation.

It's impossible to successfully deliver innovation projects from the sidelines without executive team support.

It's vital that the lead producer agrees from the outset that there is a need to develop new digital products that improve their business model.

To ensure senior managers are fully on board, we recommend adopting a toolkit such as Innovate UK's innovation canvas to ensure there is a good framework in place, with vertical lines of communication to the executive team as well as connections to the departments involved.

Covid 19

The covid crisis has highlighted the many challenges facing arts organisations looking to exploit digital content more effectively.

In the rush to find digital solutions, we are seeing a range of content being released to wider audiences such as NT Live, but the long-term effects of increased video streaming on venues and producers is still to be determined.

Smaller and medium scale organisations who have not had the budget available to invest in digital content up until now, will have to innovate more rapidly in future and will need support to invest in new methods and processes.

At the time of writing, the lockdown is still in place, and more innovative responses from creative teams are still in their early stages, but we are already seeing design led initiatives to bring audiences back into physical venues under safe conditions.

We hope this report provides some insight into the challenges that digital transformation projects present.