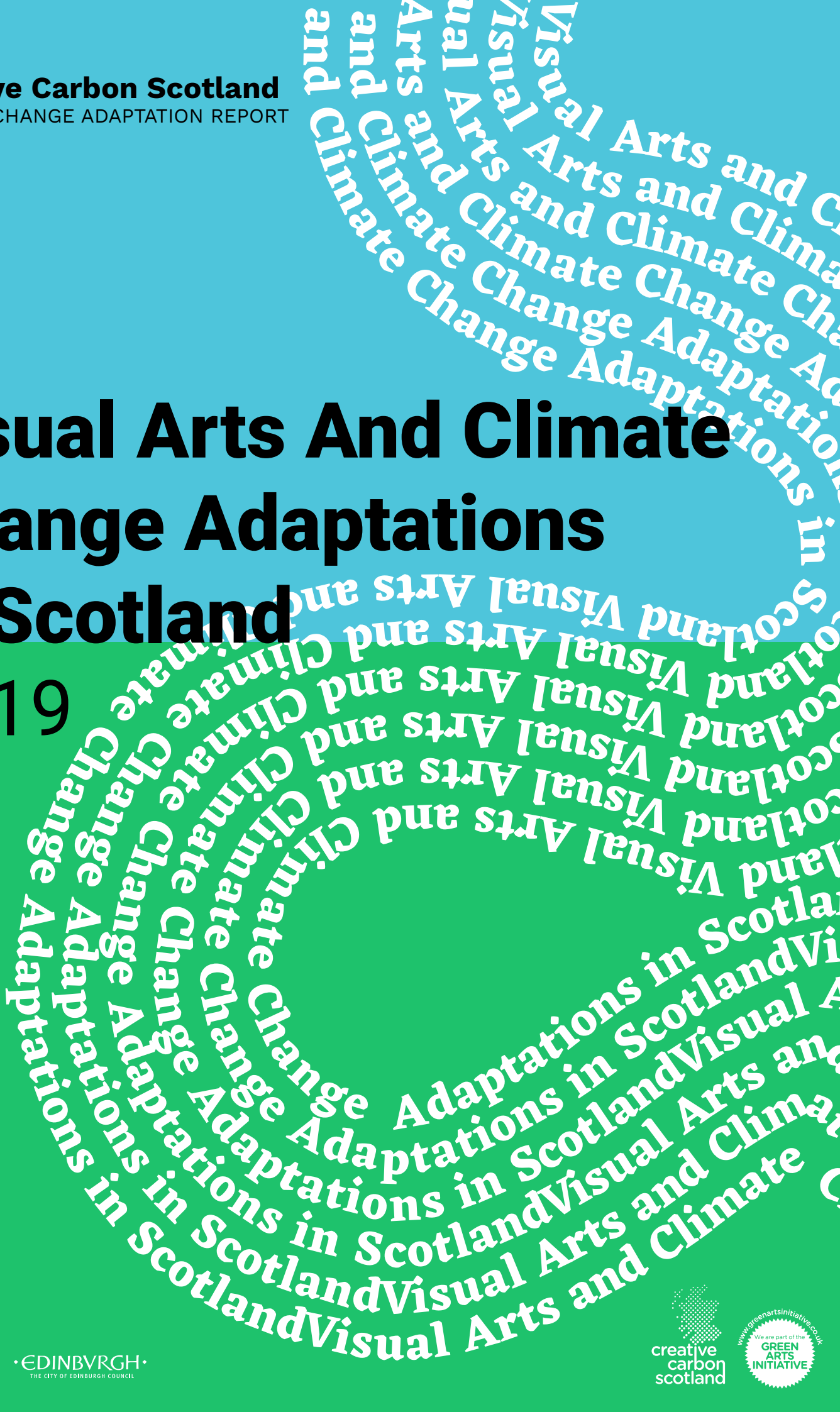
Creative Carbon Scotland
CLIMATE CHANGE ADAPTATION REPORT

Visual Arts And Climate Change Adaptations In Scotland

2019



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Contents

This research was undertaken by Justyna Ladosz, of Creative Carbon Scotland, as part of a research internship co-funded by Festivals Edinburgh, and match-funded through the University of Glasgow Santander SME Internship Scheme.

Executive Summary

Our climate is changing

- **Extreme weather: 'Beast from the East', the Summer 2018 heatwave**
- **Warmer summers and winters- average temperatures increased by around 1°C between 1961 and 2006.**
- **Changing seasons – growing season has extended by 30 days, and there are fewer frosty days.**
- **More rain - The annual rainfall rate has risen 27% since 1962**

Most of these changes have been so gradual that they are not noticed by the general public.

What is Climate Change Adaptation?

Mitigation = reducing greenhouse gas emissions, e.g. renewable energy use, cycling to work, recycling and most sustainability measures. But some climate changes are already occurring, and some are inevitable.

Adaptation = a technological, behavioural, managerial, or practical response to the changes in the climate, either already occurring or projected. Not just being able to recover from an extreme event, but to change how we work to become less vulnerable in the future.

This research

An exploratory study into the attitudes, impacts and implications for the visual arts sector of expected climate change in Scotland, it provides a series of insights and recommendations for the visual arts and wider cultural sector.

"The visual arts sector in Scotland is diverse and wide ranging. It encompasses publicly and privately funded programmes; commercial and not for profit activity; historical and contemporary work; traditional and experimental practice; gallery-based and publicly sited or participatory work; institutional, grass-roots and independent models." *(Creative Scotland, 2016).*

How is the Scottish Visual Arts Sector Vulnerable to Climate Change?

Physical Risk to Collections: Lack of ventilation, difficultly of interior climate control and poor maintenance of ageing and leaking historic buildings could damage work.

Financial Risk: Lack of funds for retrofit or refurbishment intensify issues of indirect financial loss and increased operational costs from cancelled events.

Disruption of Logistics: Disruption of power grids, I.T. networks and local and national transportation of visitors, staff and supplies will reduce capacity to operate.

Key Trends

There is a general lack of understanding and denial of climate change impacts.
Many are focused on recycling and sustainability and there is a general absence of adaptation knowledge and understanding. Even in the face of flooded buildings, or snowed in offices, many have no awareness of their connection to climate change, or the fact they will get more severe.

Very little activity is currently taking place – when it is an urgent concern.
This is part of a larger societal problem in attitude to sustainability and climate change.

There is poor integration of sustainability personnel resource.
Adaptation needs to have the backing of key individuals in leadership, and integrated into the rest of the organisation and its operations, rather than siloed with Green Champions.

Most Visual Arts organisations underestimate the impact of heat.
Scottish cultural organisations associated heat as exclusively positive, but risks from dehydration, sunburn and sunstroke are increasing.

Those who are enthused to take action are suffering from information overload.
A key obstacle is not knowing where to start.

Compromise is necessary.
We will have to change the way our societies operate, but currently no one is willing to compromise – there will be no technological or financial solution that will absolve the problem.

Managerial Adaptation

- **Be transparent about impacts**, vulnerabilities and adaptation with all staff.
- **Challenge the narrative** and communicate strategically to change behaviour and drive adaptation of your organisation. Avoid 'business as usual' preservation ideas: things are going to change.
- **Create and implement a clear Extreme Weather Event Disaster Plan** which will safeguard the building, its contents and people inside (and outside), and contingency plans for supplier or audience disruption.
- **Implement a warnings communication system**, which is not dependent on one medium of communication (in case of network disruption etc).
- **Embed sustainable and resilient practice in all areas of the organisation and source dedicated resource to support this.**
- **Include climate change in Risk Planning, Business Continuity Strategy**, and other organisational long-term goals.
- **Look for refurbishment, retrofit and relocation funding connected to climate change** and financially prepare for climate-related losses.

Practical Adaptation

- **Create green spaces** on your site to reduce heat and flood risk.
- **Consolidate stored collections** to ease security and management.
- **Compromise on indoor conditions for staff and visitors** and communicate why these changes are happening.
- **Monitor and maintain building condition** and make short-term changes (e.g. maintaining guttering) which minimises ongoing vulnerability and long-term risk. If possible, retrofit, refurbish or relocate.
- **Create a 'Disaster Cabinet'.** This may include: tools, batteries, hard hats, boots, wellies, goggles, waterproofs, torches, hi-vis, extension leads, buckets.
- **Register to use a city or region warning system if such exists.** Understand your ongoing local risks.

Introduction

"Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes" *(IPCC in SEPAa n.d.:3)*

There is a wide recognition and certainty in the scientific community that our climate is changing. The recent weather events such as ***'Beast from the East'*** or the Summer 2018 heatwave, have not been freak incidents, but part of a bigger pattern of change *(Adaptation Scotland 2018)*. The UKCP *(United Kingdom Climate Projections)* is a climate analysis tool created by the Met Office Hadley Centre Climate Programme and supported by Department of Business, Energy and Industrial Strategy *(BEIS)* and the Department for Environment, Food and Rural Affairs *(Defra) (UKCP 2018b).* The most recent climate projections show that even starker changes await us in the next 50 years.

Since climate change projections depend on how successful mitigation efforts will be globally, the UKCP has prepared predictions based on two Representative Concentration Pathways *(RCPs)*, a high emission scenario, and a low emission scenario *(UKCP 2018d:1)*. The key changes in the Scottish Climate can be summarised as ***"hotter, drier summers and warmer, wetter winters"*** which is consistent with the previous predictions *(UKCP09)*, seen in table 1 in more detailed *(UKCP 2018c)*. By the mid of the century the chance of hot summers, similar to the 2018 heatwave will be around 50%, generally the summer season will be drier but with intense storms, while winters will see even more rain. Sea level will rise in all emission scenarios around the UK *(Lowe et al 2018:10)*. These are projected to be biggest in the south of England, meaning London will experience higher sea rise than Edinburgh, which in the low emission scenario are will experience sea rise between 0.08m – 0.49m, rising to 0.9m in the high emission scenario *(UKCP 2018d:5)*.

It is important to stress two aspects of these projections:

1. Patterns will vary on a seasonal and regional scales *(UKCP 2018d:3)*, the UKCP is planning to release more detail projections on local scales, including information on localised rainfall and flash floods in 2019 *(UKCP 2018d:2)*, such tools will be incredibly useful in adaptation planning.

2. The projections do not mean that every single summer will be hotter, and every winter will have increased rainfall. ***"Climate change shifts the odds of those extreme seasons"*** *(Met Office n.d., 1:48)*, an important consideration when communicating the climate change adaptation message.

The trends identified in the UKCP18 are consistent with those published in UKCP09, but on an increased scale *(UKCP 2018d:3)*. Based on the data in UKCP09, the Scottish Environment Protection Agency *(SEPA)* created more specific projections for Scotland. It estimates that climate change will result in higher risk of flooding, currently one in twenty-two residential properties and one in thirteen of non-residential properties in Scotland are at risk of flooding *(SEPA n.d. Our Climate Challenge:7)*. The climate in Scotland has been changing already: on average temperatures in Scotland have risen just under 1°C between 1961 and 2006. The growing season has extended by 30 days, and there are fewer frosty days. The annual rainfall rate has risen 27% since 1962 *(SEPA n.d. The effects of climate-change)*. Most of these changes have been so gradual that they are not noticed by the general public.

	SUMMER PRECIPITATION CHANGE	WINTER PRECIPITATION CHANGE	SUMMER TEMPERATURE CHANGE	WINTER TEMPERATURE CHANGE
LOWEST SCENARIO	**30%** drier to **6%** wetter	**4%** drier to **9%** wetter	**-0.1°C** cooler to **2.8°C** warmer	**-0.3°C** cooler to **2.7°C** warmer
HIGHEST SCENARIO	**40%** drier to **8%** wetter	**3%** drier to **12%** wetter	**0.6°C** warmer to **4.8°C** warmer	**0.6°C** warmer to **4.5°C** warmer

Table 1: Climate Projections. Based on UKCP 2018c.

To cope with these changes adaptation and resilience are necessary. Both the IPCC and the UKCP make this clear: ***"even given strenuous efforts to limit the cause of global warming, further climatic changes are inevitable in the future"*** *(UKCP 2018d:1)*. Similarly, the IPCC warn that human activities already caused around 1°C of global warming, which is likely to reach 1.5°C between 2030-2052 *(IPCC 2018 A.1)*. The key message is that:

"Warming from anthropogenic emissions from the pre-industrial period to the present will persist for centuries to millennia and will continue to cause further long-term changes in the climate system, such as sea level rise, with associated impacts." *(IPCC 2018: A.2)*.

The current mitigation fight is to stop the rate of global warming before it reaches 2°C, as this would have a much more disastrous effect on the Earth and its systems. *(IPCC 2018: A.3)*.

Why Adapt

"Future climate-related risks would be reduced by the upscaling and acceleration of far-reaching, multi-level and cross-sectoral climate mitigation and by both incremental and transformational adaptation" *(IPCC 2018A.3.3)*

Adaptation to the inevitable changes in the climate is vital for the continued survival well-being of our societies. It is almost certain that climate change will affect vulnerable populations the most *(IPCC 2018 B5.1)*. Adaptation and increasing resilience will reduce the risks to our health, economic growth, and our urban areas *(IPCC 2018 B6)*. It is vital that all parts of our society are aware of these changes and prepare for them. The Visual Arts sector has a key role to play in this process.

These adaptations should be transformative in their nature and will build on the changes we have already made in order to mitigate against climate change *(SEPA Our Climate Challenge:4)*. Good information must form the basis of adaptations and decision making. Resilience planning will have to take into account a range of possible changes and actions and use up-to-date information to make the best decisions. Adaptation should not be seen as separate from mitigation, and must be carried out in a way that is not counter-productive, i.e. does not create more greenhouse gases. While attempts at sustainability and mitigation must continue ***"our adaptation plans should include preparation for worse climate change scenarios."*** *(UKCP 2018d:1)*

Terminology

At this juncture it is worth to discuss the differences between mitigation and adaptation and clarify the different kinds of adaptation possible. Put simply, mitigation ***"encompasses measures and activities aimed at reducing GHG [greenhouse gas] emissions"*** *(Sesana et al 2018:2)*. Common examples include recycling, renewable energy use, cycling to work, and most sustainability measures. Adaptation on the other hand, is a response to the changes in the climate, either already occurring or projected (Sesana et al 2018:2). The adjustment ***"moderates harm or exploits beneficial opportunities"*** *(IEMA 2013:2)*. Often, adaptation is understood as increasing resilience of societies to withstand the climate changes. However, the two concepts slightly differ, in that resilience aims to increase capacity to ***"recover from the effects of a hazardous event in a timely and efficient manner"*** (IEMA 2013:2), contrastingly, the key part of adaptation is modification of a system, not just making sure it can withstand the hazardous stimuli.

Adaptation does not mean lack of mitigation, it means recognising that certain changes are already occurring and future ones are inevitable, no matter how much GHG emissions are reduced *(UCKP 2018d:1)*. Pointedly, adaptation is not an attempt to preserve our society and way of being exactly as it is right now.

It includes ***"changes in the socio-environmental processes, perceptions, practices, and actions"*** *(Sesana et al 2018:2)*, we will need to think of our cities and our lives differently, rather than relying on financial solutions to the problem. Adaptation measures can be technological, behavioural, managerial, or practical *(Sesana et al 2018:17)*. Differences between reactive, proactive, incremental and transformational adaptation will be discussed in the recommendations section.

Aims and Goals

This project recognises that there is a gap between climate change impact predictions, policies and practices in Scotland and the Visual Arts sector.

"The visual arts sector in Scotland is diverse and wide ranging. It encompasses publicly and privately funded programmes; commercial and not for profit activity; historical and contemporary work; traditional and experimental practice; gallery-based and publicly sited or participatory work; institutional, grass-roots and independent models." *(Creative Scotland 2016:11).*

The report aims to explore the attitudes of organisations in the sector towards climate change and adaptation. Given the unique nature of many arts organisations it also aims to identify impacts and capabilities of the sector to adapt. The main body of the report is divided into three sections. The methodology outlines the approach and process of gathering information. The discussion section is the result of interviews carried out with stakeholders in the sector as part of the project. The recommendations section aims to develop on insights gained in those interviews to explain the impacts on Visual Arts Organisations (VAOs) as well as make commendations on how they can become more resilient.

Impacts

Due to the very specific occupations, operations and business models of VAOs, the way they will be impacted by climate change will be different than that of other businesses in Scotland.

Diagram 1 summarises these effects in clear categories.

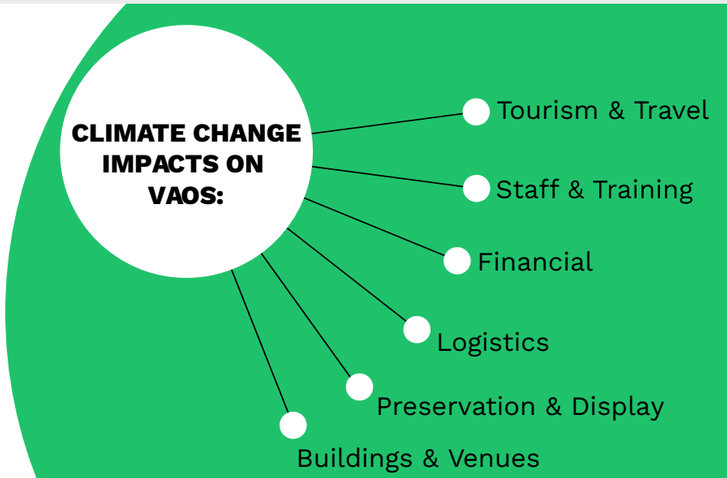


Diagram 1 Impacts of Climate Change on Visual Arts Organisations in Scotland.

Methodology

Problem

The project was designed to explore a perceptible problem in the sector, the lack of preparedness to the changing climate.

The research aimed to gain information about the operations of Visual Arts organisations (VAOs) in the region, their perceptions on climate change, what impacts have been perceived so far, and how have they been reacted to. Further, it sought to identify adaptations which have been made or which are possible from the perspective of individual organisations were of interest.

The underlying reasoning behind the primary research for this report was the need for an increased understanding of the Visual Arts sector in Edinburgh and its climate change adaptation capabilities. The study was exploratory in its nature, aiming to be indicative rather than definitive in its results. The brief focussed on exploring the knowledge of climate change, mitigation and adaptation, as well as attitudes and actions connected to those three concepts within Visual Arts organisations in Scotland.

Approach

The research method focused on carrying out semi-structured interviews with visual arts organisations based in Glasgow and Edinburgh.

The research focused on organisations rather than individual artists, or policy makers. In total, seven participants took part. The interviews lasted between 15 and 45 minutes, their length depending on the time available and the flow of the conversation. Most interviews were recorded and transcribed. Potential participants were identified from among those organisations with whom Creative Carbon Scotland *(CCS)* and Edinburgh Art Festival had an existing relationship, organisations that were identified as significant in the visual arts sector in Glasgow and Edinburgh based on independent research, and those who attended the Green Arts Conference held in November 2018.

In total 21 potential participant organisations were contacted by email. Of those, eight produced no response, five expressed initial interest but were either not interviewed due to subsequent lack of follow through or time constraints. Overall, the best rate of response and participation was among those organisations with close ties to CCS. Within organisations which agreed to participate, most interviewees were either sustainability officers, building or office managers, or tangentially connected to sustainability issues. In some instances, the interviewee was directly contacted, since they had ties to CCS, or was identified by the organisation itself as the most appropriate person to talk to in relation to the research inquiry.

Participant interviews were carried out between November 2018 and January 2019. The size of the sample was somewhat limited due to the short time allowed for carrying out of the study, as well as difficulties in recruiting participants, a situation common to qualitative research projects *(MacDougall & Fudge 2001)*.

The problem was also approached through secondary research which examined climate impacts and adaptation measures across the UK and Europe. Those most applicable to the Visual Arts sector in Scotland where selected based on the insight gained from interviewing stakeholders.

Interviews

The research process took the form of semi-structured interviews, each concentrated around five key questions, and each developing in different directions. Therefore, individual interviewees answered slightly different questions as determined by the flow of the conversation. This suited the needs of the research and was appropriate given the variety of VAOs in Scotland. Every meeting however, started with a clear explanation of the project and obtainment of informed consent.

Questions centred around the following:

1. What does your organisation do and what is your role within that?
2. How has climate change impacted this so far? (Prompted by case study e.g. “Beast from the East”/heatwave)
3. What is unique about how you operate compared to “normal” businesses and other cultural organisations?
4. What will be the biggest threat?
5. What are your ideas on how you could change your practice?’

Participants were also given an opportunity towards the end of the interview to voice what they would like the report to include. As mentioned above, each participant was informally asked for consent, and all agreed for the information gained to become part of the report. Most were happy for the report to be published without further checks from them. Most interviews were recorded and transcribed. A few participants took the opportunity to follow up on the conversation and add to their response through additional email exchanges after the interviews took place.

Justification

Interviews were chosen as the most appropriate form of research, over questionnaires or focus groups for several reasons.

From the beginning it was clear that questionnaires would not provide the depth of information necessary to fulfil the aims of the study. Interviews were perfect since the research aimed to explore not only adaptation practices, but also views, attitudes and issues. These are impossible to glean from questionnaires. Focus groups were decided against based on two main reasons. Difficulty in arranging a time that would suit the participants within the short time frame possible, and the variety in organisations identified. It was clear that the differences between them would be difficult to explore in a focus group. Furthermore, since interviews are arguably most useful for researching areas which are understudied and little known *(Gill et al 2008:291)*, using them for adaptation was the best fit. Further, it was felt that semi-structured interviews had the most advantages, as they allowed for an approach tailored to each participant, as well as the possibility to diverge and develop on themes not identified in previous research *(Gille et al 2008:291)*, while the key questions identified previously made it easy to keep conversation focused on the research aims. This format also allowed for change of focus through the process of data collection and ‘progressive focusing’ *(Schutt 2011:322)*.

Sampling and Generalisation

The aim of the project is focused on organisations within Scotland, especially Edinburgh. It was felt that VAOs in Glasgow would also be useful participants as they are in a similar position to Edinburgh, in terms of environment, geography and socio-economic profiles of the cities.

This had the added benefit of making the project findings more generalisable to other cities in Scotland. While the sample size may seem small, it was deemed to be sufficient given the scope of the study, as well as the time available to the researchers. Further, the participants selected for the study provided a good cross section of the sector in terms of size, number of employees, financial status, their level of availability to the public, the kind of visual arts engaged with, whether they included an educational element, or organise exhibitions, their business model, as well as whether they are a private or a public body, or somewhere in between. Most importantly they varied in their level of awareness of climate change, preparedness for its impacts, and dedication to sustainability.

Analysis

Participants are anonymised throughout the text, as Visual Art Organisation One to Seven (VAO), each is given a short characterisation in the section below to aid categorisation for the reader.

Their responses were analysed by identifying categories, patterns and relationships in the data. The analysis focused on the text literally, that it as an actual representation of the participants knowledge, attitudes and feelings. Secondly it was approached interpretively, scrutinising the unsaid and constructing an interpretation of what the data is showing *(Schutt 2011:321-4)*. The analysis took a four-part process. Firstly, interviews were documented by transcribing them accurately, secondly the data was organized into six categories. These categories were then analysed to see the connections and contrasts between different organisations. Finally, the data was represented in the section below.

Discussion

Participants categorisation:

VAO One: the interviewee was working at the heart of the organisation as an assistant to the director. The organisation is an international festival organisation with multiple independent partner organisations.

VAO Two: the interviewee was the learning manager. The organisation is a gallery heavily involved in engagement activities which include exhibitions, art residencies, and educational courses.

VAO Three: the interviewee was the sustainability officer of an arts education organisation.

VAO Four: the interviewee was the studio manager of an open access studio organisation. Their activities include gallery exhibitions, publishing, educational courses and art residencies.

VAO Five: there were two interviewees, the studio administrator and the property maintenance officer of an art studio landlord.

VAO Six: the interviewee was the sustainability officer of a large Scotland-based museum.

VAO Seven: two artform officers represented the organisation. The organisation is a distributor of grant funding in the cultural sector. It also has an overviewing role in the sector. Because of this the participants commented on the state of the whole sector, not just their own practice.

Knowledge of Climate Change and its Impacts.

The biggest difference in knowledge of, and attitudes toward, climate change was revealed between organisations which had dedicated sustainability officers, and those which did not. A common response from those in the second category to questions about perceived impacts of climate change was a claim of no noticeable effects. However, once prompted, most participants could identify at least one way in which climate change affected their practice during the last year (2018), most citing office closures and building vulnerabilities. VAO One reported no perceived impacts of climate change, even though its main event happens in the middle of the summer, therefore future impacts will be considerable. One of their events needed more bottled water supplies due to increased demand, but the focus of the participant was on the waste created, rather than the perception of this as a problem. One participant (VAO Two) openly admitted that climate change has been "on the backburner" due to more pressing issues. Even though the participant reported numerous issues with the building that impacted everyday practice, they did not make the connection to climate change. VAO Four was quite aware of the impact of extreme weather on their building, but unsure if this was getting worse in the last few years or connected to climate change. The participant was one of the few who expressed confidence in dealing with the challenges of occupying a historic building and the impacts of climate change.

VAO Seven felt quite knowledgeable about climate change as the participants had received training about this from Creative Carbon Scotland, but had not identified any effects of climate change on its own practice. The main office was closed during the 2018 snow storm ("Beast from the East"), as it was unsafe for people to travel, but staff could easily work remotely. Moreover, the interviewee stated that such events have been normal throughout their career and school life, and therefore are not considered a new consequence of climate change. The participant also remarked that there is no financial impact on the institution through such breaks in operations. On the other hand, they were aware that such events might last longer in the future and therefore become a problem. There was also clear awareness of the considerable impacts climate change is already having in the Highlands and Islands.

Three participants were quite clear about the impacts of climate change and aware of the increased frequency of extreme weather as well as other changes to the climate: VAO Three, VAO Five and VAO Six. However, each had a different approach for dealing with this. VAO Five had a similar attitude to VAO Four in describing the effects as a "nuisance". It was very aware of the increased rainfall in the city, however, due to a number of factors, not in a position to safeguard against this. Both VAO Three and VAO Six expressed awareness of the long-term changes in their local climate, and considerable worry about ability of their respective organisations to cope.

Attitudes toward Adaptation and Mitigation

VAO One paid little attention to either mitigation or adaptation. The organisation focus their attentions mostly on green policy and sustainability, but has little power to affect partnering organisations, and were aware of the limits of the efficacy of such methods. The participant was worried about future impacts, but expressed hopes of resilience: *"time will tell and you kind of adapt to what you have to adapt to",* giving the impression that the severity of potential impacts is not fully recognised. As VAO One organises a festival in the summer season a resilient attitude will be key to their future operations.

VAO Two perceived its adaptation potential as limited due to its financial situation. However, the interviewee openly admitted that climate change has not been a priority.

VAO Three focused on mitigation and sustainability, especially attempts to make users (students) care about climate change, and highlighted the need for systemic change for either mitigation or adaptation to work. The participant admitted to favouring mitigation, considering adaptation as *"giving up"* and an attempt to preserve our society exactly as it is. Instead, the participant argued we should change the conversation and use climate change as an opportunity to create a better society, again highlighting need for behavioural change. The participant also claimed that adaptation is easier, as it only needs to engage few core people in charge of the organisation, not the whole organisation that is needed for most mitigation initiatives.

VAO Four was clearly focused on sustainability and mitigation in practice, it was very proud of making its artistic practice sustainable, through a water filtration system and plastic recycling among other measures. Some adaptation measures have already been undertaken, even if the organisation is not necessarily aware these have to do with climate change (e.g. their archive being physically raised to reduce risk from flooding). The organisation has had to face many issues with its current building which promoted resilience among its staff. Its new building is made sustainable and probably adapted to changes in climate, according to the interviewee it *"it is the most-high tech, environmental, sustainable building".*

VAO Five highlighted issues with embedding sustainability in the organisation. The lack of sustainability officer and its business model meant good policies and intentions often yielded no results. Similarly to VAO One, the participant has no influence on what the artists within its studios do. The participant had clear awareness of climate change impacts, which should lead to adaptation but financial difficulties as well as nature of the buildings were viewed as major stumbling blocks. Therefore, simple mitigation – recycling, cycling etc. are the focus of the organisation. The organisation has an interesting maintenance policy: on the one hand it deals with issues as and when they come, on the other, their senior leadership and board of trustees is working on a 25-year plan, which exhibits more future thinking than other organisations. Perhaps there is a need for a more short-term or incremental adaptation plan as well.

VAO Six has so far been focusing on mitigation, especially its carbon footprint. The sustainability officer post is relatively new (two years) and so far has been focusing on sustainability. Future plans are very ambitious, for example embedding sustainability in each department. The organisation claimed to be at a turning point, switching its focus from mitigation only and embracing adaptation. There are plans to plan for it and include it in the business continuity or risk strategy, as well as ideas for closer collaboration with the Edinburgh Adapts programme.

VAO Seven described itself as quite resilient to the impacts of climate change, simply closing its office operations when needed. According to VAO Seven, Highlands and Islands communities are more aware of impacts of climate change as it is already present in their everyday lives. Contrastingly, they commented that there may be a disconnect between accepted knowledge and perceived changes:

"when you are in the city, of course you are mindful... you understand what the research is telling you... but maybe you're not seeing these extremes that might be impacting on the way you work."

VAO Seven engages with both organisations and artists in Scotland, and was aware that it is easier for individual artists to make changes to their practice, while bigger organisations might struggle with this.

Operations and Vulnerability

VAO One

The organisation has no control over its own buildings or utilities, therefore strategies have focused on mitigation such as being paperless or energy efficient. Their biggest challenge is international travel. *"We don't know year on year what is going to happen, so we don't know what artists, we might have a plan of artists we want to work with, but we don't know what they are going to do, what materials they want".* This approach makes the organisation vulnerable to numerous impacts, and is not going to be possible in the long term.

VAO One, as a festival organiser, sees the challenges as one of artistic unpredictability as well as tourist unpredictability. Artists changing their mind at the last minute and needs for new supplies, usually resulted in a member of staff in a taxi in *"frantic rides across town"*. The interviewee admitted that such last minute purchases are difficult to source sustainably. The organisation is aiming to plan better. This is obviously quite a big adaptation vulnerability, and the lack of contingency plans in case of disruption is going to be more difficult to deal with as our climate changes. The organisation seemed to be unaware of any impacts of climate change so far and the biggest perceived threat was financial. Lack of awareness of climate change impacts probably partially stems from the fact the VAO is an organiser, and not closely involved with everyday experiences of its partners. Increased collaboration to monitor the current situation would be the first step in adaptation.

International Travel was another perceived vulnerability. When the participant was faced with the vision of extensive travel disruption the VAO was clear that the artists and art arrive about a month before the festival actually opens, which decreases their vulnerability. The participant was aware of the difficulties international travel in the future:

"we always want to bring international artists to Scotland... to show that we are part of that global community, to show that it is a big festival and we can attract major international artists".

More domestic artists could be the solution in the future, but the participant was clear they do not programme based on geographical proximity. The participant admitted that monitoring and back up plans can be a strategy in the future, but definitely have not been so far. Another perceived issue was that of funding, especially if international travel increases in cost, due to more interruptions or restrictions. Perhaps planning for a weather disruption related emergency into the yearly budget would be the easiest solution.

The issue of heatwave during an outdoor festival was not perceived as a problem so far, which might indicate organisational resilience. However, as heatwaves will be more regular and severe the organisation will have to adapt for this.

VAO Two

The organisation focuses on allowing people to engage with art:

"through the events and creative programme, residencies and our facilities, we offer an access point for people at all levels to engage".

It became clear during the interview that this was the core to the ideology and operations of the organisation. Each of these elements could create different vulnerabilities.

The organisation rents a council-owned building and is responsible for all repairs. The particular building occupied, while owned by the council, has issues that open it to stark climate change vulnerabilities: for example, the heating system and boilers being *"at least 30 years old"*, while the roof needs repair. There is a lack of funds to attend to issues such as mould in the basement where the organisation has production facilities. The organisation has considered relocation, but feels stifled due to the Edinburgh property market, where both funds and location would be an issue. Extreme weather has stopped visitors from getting into the galleries but is not seen as majorly disruptive to the other parts of the organisation. Administration work can be done remotely, and educational courses are structured flexibly. The gallery also exhibits international works, as well as works produced in-house and works from Scottish collections. So far, the organisation has not taken weather impacts into consideration when planning. The participant interviewed was responsible for the educational side of the organisation and therefore unsure whether there were contingency plans in place in case of event interruption.

Given the variety of different *"opportunities to engage with the art form"* and the current state of the building this particular organisation appears quite vulnerable to climate change impacts, with little potential for adaptation due to perceived financial constraints.

Perhaps reframing funding applications in terms of climate change could open up new avenues of funding for refurbishment or relocation.

VAO Three

The institution is in many ways in a unique position since it occupies a new building. It has also experienced a major destruction of one of its buildings in the past, which is now unusable. Its reactions to this event can be quite instructive, even though not caused by climate change.

One of the biggest vulnerabilities to the operations of the organisation is the fact that it needs the students to make their way into the building. Climate change will have an impact on students travelling to and from Scotland in between terms, as international travel may become more difficult and more expensive. One of the adaptation possibilities highlighted here by the participant is organising things for international students to do between terms, so travel would not be a necessity.

On a day to day basis, as an art school, each student has their own desk space and teaching is studio based. Students need to be in the building to carry out their work. Moreover, human interaction and collaboration is vital to their process. Physical presence in the building is vital to how the school operates, remote work or meeting online is not really an option, in the way it is for most other educational activities or businesses. This is a big challenge. During extreme weather events the school's priorities are with their duty of care to the students. This is not just an issue of students being able to get into the building, but also to safely get back home. The existence of a good communications system was highlighted during discussion of the *"Beast from the East".* Other organisations, not only those which have educational programmes, but all of those which admit visitors into their venues will have to make similar considerations and safety protocols.

"At what point do you decide to close the building and send people home?"

Such questions need to be decided before extreme weather events happen. As the participant highlighted this is difficult as it depends on the city infrastructure. The hope that the city will become better prepared for this was raised.

Another vulnerability identified (almost uniquely) was connected to the complications that warmer weather will bring. The contemporary main building is not fitted with air conditioning but depends on a ventilation system, which will not be sufficient in the future. A similar issue was raised by VAO Five, whose newly refurbished building only has an air circulation system, and a glass roof. Again, here VAO Three highlighted the dependency on the city electricity grid, where one line breaking can result in large parts of the city being without energy. The frustration of dealing with extra-institutional issues that one has no impact upon was common throughout the interviews.

VAO Four

Similarly to VAO Two, the organisation has diverse modes of engagement with the public and artists. It is basically an open access printing studio:

"primarily an open access organisation, so we provide access, subsidised access to printmaking facilities to our members, we have about 300 members...".

Members can book workspaces and printing presses online after they have completed the instruction course. Income is derived through the memberships, a publishing programme, an on-site gallery and exhibitions, as well as commissioned works. Perhaps there is future financial safety in this diversification.

The organisation is at an interesting cross-roads, currently *(Jan 2019)* still based in an old building which faces many issues, but moving into a refurbished building soon. The interviewee highlighted the impact of the weather on its current council owned building. The staff has dealt with issues such as leaky roofs, mould or floods in the basement, and became quite resilient in the process. The organisation decision to relocate however, was not related to climate change, rather based on other factors, such as accessibility issues and the size of its current building. VAO Four received funding from *"Creative Scotland, and from Heritage Lottery because of the listed status of the building, and from various other organisations".* The new building needed an almost complete renovation, therefore a company specialised in heritage projects was employed. The new building also promises to be sustainable and more adapted to future changes in the climate.

Overall the participant was quite positive about the organisation's ability to adapt to the future.

A unique vulnerability discussed by the participant was the lack of funds for building maintenance, which resulted in the artist-technicians taking responsibility for minor repairs to the building. When asked about the biggest challenge for the future, the participant expressed worry about paper conservation, as changes in humidity and occasional flooding affected the archive held on site by the organisation, as well as the challenge of sourcing materials and transporting members, where travel links will be disrupted in the future. Since most members and users of the organisation are local residents, rather than artists visiting for events, their inability to travel in case of rare, one-off extreme weather events and interruptions will probably not have a huge impact on the organisation. The difficulty of supplies, which often travel from mainland Europe, could be much more damaging, again however, depending on extra institutional factors the organisation itself can do little about, other than changing its suppliers and planning in advance which is not always possible.

Comparison with international art events was made, where cancelling events has a huge financial impact. For VAO Four, international ties usually take the form of residencies, which are easier to reschedule if weather interrupts the original plans.

VAO Five

An arts landlord, it has thirteen fulltime members of staff, and looks after nineteen properties across Scotland, renting studio space to *"artist-tenants"*, generally on long-term leases. Three buildings have *"live-work space"*, and a few buildings have more commercial creative industry tenants. The organisation is therefore unique in that it operates in many ways like any commercial organisation and has no creative input into the work of its tenants. This means that issues such as increased uses of heating and air conditioning will affect individual tenant studios and tenant bills, rather than the organisation overall. While based in Glasgow the organisation has buildings spread over the entirety of Scotland, and will have to prepare for different impacts in different locations.

The biggest vulnerability identified by the organisation is the state of its buildings. The organisation refurbishes historic buildings for its uses, because of the push by city councils to re-use them for creative purposes, which is tied to sources of funding for heritage properties. Unfortunately, this means that there are problems with the fabric of the buildings, the solving of which is difficult due to their listed status. Financial costs of refurbishing a historic building are much higher than that of a modern building, partly because of the techniques and materials required to be used to keep the listed status. This has biggest impacts on insulation of the buildings, windows and roofs.

Currently, rain causes one of the buildings' roofs to leak, sometimes flooding the building. Interestingly the interviewee was very aware of the fact that rainfall has increased in intensity in recent years, and the leaky roof is not just a case of an old roof, but a structure that was never prepared to be dealing with the climate as it is now. However, structural changes to the roof are impossible, because of its intricate construction; making it waterproof is financially not viable. Currently the leaks are a nuisance, but do not cause enough damage to financially justify adaptation. The roof is also dangerous during times of high wind, as the glass panels move. The organisation closes the building to the public during such times. As they have no measurement apparatus of their own the organisation uses the council's warning system for a similar building in the same city, a clever adaptation measure. There is also no cooling system, again a situation common to many buildings in Scotland. Extreme weather events are seen as more of a nuisance than a threat to the organisation.

The organisation is not responsible for any damage to tenants' possessions; currently issues with the building have little impact on its financial income. The building is also used to hold events, which are scheduled at least six months in advance. This makes it impossible to prepare for what the weather will be and how the building will behave during an event. All event organisers are made aware of this. Indeed, when I visited the venue during an event this winter, the roof did leak, and buckets were on the floor, but no major hazard to visitors was apparent.

Another issue the organisation faces is engaging its tenants in sustainability. As expressed by another participant *(VAO Three)* behavioural change will be essential to dealing with climate change, whether mitigation or adaptation. Currently VAO 5 has no sustainability officer, which is perhaps why environmental and sustainability issues are rarely enforced. The organisation reported that often best intentions expressed in their sustainability policy when it comes to refurbishing buildings, are quickly dropped to save initial investment costs:

"it's the implementation that is then a problem, because of financial considerations... there is potentially a thought that there are bigger things to be dealing with at the moment".

Another clear indicator that to be successful mindsets must change, and investments must look at long term saving rather than initial costs of implementation.

VAO Six

The biggest vulnerability and worry about the impacts of climate change perceived by the participant was keeping the collection safe. Particular art conservation standards require that art be kept within certain temperature and humidity parameters. In times of varying weather change and increasingly warmer climate this will result in higher energy use. Currently the museum uses a "building management system" to do this. This is a difficult problem to solve, but the participant suggested changing the system provider to allow more controls. They also said that the recommendations *(PAS 198:2012)* allow for small fluctuations in humidity and temperature, say between 20 – 25 degrees, rather than constantly keeping a room at 23-degree temperature. This would considerably reduce energy use.

The participant was particularly worried about the structure of the buildings. Refurbishments were undertaken over the last 20 years, and the participant was clear that even though the buildings were listed, doing work to them was possible, through a special application process. The participant was very clear about the threat of climate change to its organisation:

"if it got to the extremes, if we do nothing about reducing carbon and climate change at the moment and our worst fears come to realisation... I don't know how these buildings could function in extreme events like that."

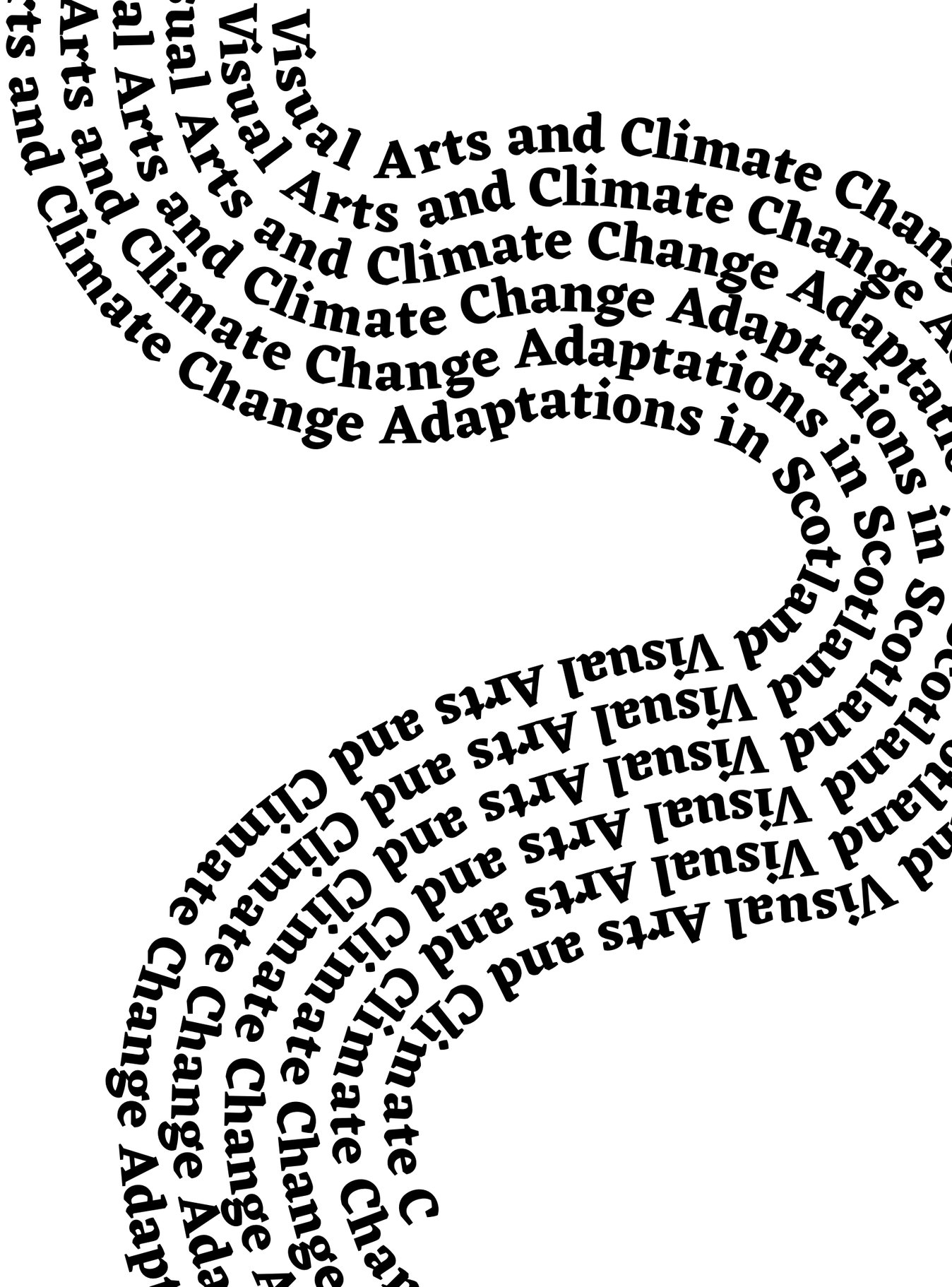
Elaborating that they will not be good environments for visitors to be in without the extreme use of heating and cooling systems.

Because of the challenges of being housed in a historic building, its stonework is fully investigated every five years:

"the stonework check is every 5 years and is significantly thorough and gives a plan of action for repairs. We also do a lot of roof and pipe checks after we had a drain pipe choke 3 years ago. Worries about heavy rain and flash flooding mean that the rainwater could overflow if the pipes weren't clear."

It is refreshing to see a participant aware of challenges and actively monitoring them to prevent damage in time. In the past, due to the building condition the participant had to "evacuate" artworks in one of its spaces. *"The Art Handling Team just move it to another room or one of our workshop spaces and the gallery space gets closed to the public."* Further the participant is aware that heat on the outside and the inside may damage the building.

Despite this mostly negative outlook, the participant is one of the better prepared ones revealed in the study.



VAO Seven

The difficulty of continuing work on an international level for many RFOs was mentioned by the participant. Many smaller VAOs are encouraged and motivated to be involved in the international art world. This creates tensions with their mitigation plans and aims to reduce their carbon footprint. Whether transporting artists or works of art to and from Scotland, there seem to be no mitigation or adaptation solutions for an artistic practice that wants to be international. The participant remarked on the difficulty of this conflict but offered no solutions.

The organisation commented that festival and outside events are sometimes cancelled because of extreme weather but was unsure whether this was happening at an increased rate. However, it also highlighted that arts events were prepared for this through contingency plans and health and safety measures, recalling that one event a few years ago:

"[We] had a whole range of contingencies, you know, from giving people ponchos to shutting things down when it became extreme, when the wind was going to get to a certain level."

The participant stressed that such measures were always in place during professional art events as health and safety requirements and matters of liability insurance, rather than climate change adaptation. However, the participant did not suggest any measures which would allow events to continue in extreme weather.

VAO Seven described the sector in Edinburgh as *"building based"* and identified the biggest threats of climate change as travel and transportation of people and artworks and impact on buildings. Being able to stage things on time was the biggest worry, especially if shipping was disrupted.

The participant was also aware that *"crumbling buildings"* might be a problem, but was quick to clarify that as museum and gallery spaces must meet environmental conditions to show works of value:

"...buildings that host really great works of art are looked after and they can't really hold those valuable works of art if they are deemed at risk... anyone working professionally in the Visual Arts would not put any artwork no matter what its value on a wall if you think it's going to flood".

The participant was also aware that art conservation might become a problem, especially in terms of greater energy use. They clarified that while *"an artwork can withstand most things"*, extreme fluctuations are the biggest risk. While continuing the subject of crumbling buildings and vulnerable works of art the participant supposed that many organisations which are displaying works of less value *"are starting to relax"* their environmental conditions standards.

The participant was also able to see the opportunities climate change may give the sector, especially through the tight environmental controls in museums and galleries:

"I think that hot summers could be of benefit to the sector... actually a hotter summer might drive more people in to galleries and museums. They sometimes want to seek shelter"

Vulnerability of production facilities was acknowledged by the participant, especially in discussion of individual artist's studios, which through a lack of funds are often in a state of disrepair. VAO Seven highlighted the difference in this situation for many organisations, which due to ongoing investment in Scotland, have *"world class facilities"*.

The issue of communicating in case of extreme weather and general weather disruption was a topic dwelt on at length. Rural communities which depend on landlines were of special concern. The participant was aware that power disruptions will cause most systems to crash, and technology disruptions, especially lack of access to emails, will cause organisations throughout Scotland to stop operations.

Possibilities and Challenges Highlighted by Participants

One of the key messages appreciated by most participants is the importance of planning, especially for events. A key adaptation strategy should be the creation of contingency or emergency plans which will minimise financial loss, if extreme weather disrupts an event (VAO One), travel for visitors and visiting artists, or transportation of artworks and art supplies (VAO Four). VAO Seven highlighted the wealth of resources already created for past outdoor events in Scotland, and suggested that the pooling together of different artist and organisational practices would allow for their refinement and be of benefit to the entire sector. The participant also raised the possibility of documenting works and events as a way of adapting to climate change disruptions, especially cancelled events. If *"things were documented and distributed"* this would allow visitors to *"have another way of engaging with your work"*. The participant also highlighted that some artists are already considering different ways of making their work accessible to those with mobility issues.

Behavioural change was emphasised by two participants (VAO Three and VAO Five). VAO Three suggested that sustainability should be connected to all grant funding, as a way of enforcing its importance. They also suggested that adaptation might be easier than mitigation as it requires changing the minds of key decision makers, rather than whole organisations. Making people care by engaging with them through shared values was also suggested, as well as *"talking to people in their language"*.

There is perhaps truth to it, as VAO Six confessed *"we are going through a big strategy change at the moment, and sustainability is a big driver in that"*, the support of the SMT (Senior Management Team), was highlighted as a driver of these changes a couple of times. VAO Seven suggested the presence of a person responsible for sustainability among board or trustee members as significant for adaptation efforts. It was also enthusiastic about the sector affecting behavioural change specifically through being transparent in its ideas with visitors. Additionally, the institution argues that cultural organisations often want to change but do not know how to, and see money as the biggest barrier. The participant was very positive about the ability of the sector to adapt. It expressed that while individual artists are already adapting and developing sustainable practices, bigger institutions face more barriers going through the process, especially where boards and trustees are driven by the *"bottom line"*, rather than visions for the future. However, according to VAO Seven, the unique business model of VAOs, namely different financial concerns *"leaves space to have those conversations... visual arts is the environment that welcomes discussion and change".*

As mentioned earlier, VAO Three has had to face a major emergency when one of its buildings was destroyed. This has emphasised flexibility of space as an adaptation measure, the institution was able to office share, and move its various operations to a few different locations,

accentuating the resilient and collaborative spirit of the sector.

It also emphasised the importance of incorporating Climate Ready Clyde and other regional resources into its risk planning process. Similarly, VAO Six is planning to work with the business continuity strategy, which risks comes under, to incorporate adaptation. Risk planning for climate change events should be a priority, especially for those organisations working with the public. Climate change can also be considered in the business continuity strategy as VAO Six is planning to do. Here an important factor was identified by VAO Five, whose board of directors and Senior Management Team are focusing on a long-term maintenance plan with increased sustainability (which could be understood as adaptation especially when talking about heating buildings etc).

"it's a kind of two-step process, get the company up to a size that is sustainable it can run itself, and then look into the future and make sure we are still here within 25 years or so".

Many arts organisations participating in the study were simply not financially stable enough to plan long-term changes and considering the impacts of climate.

Disaster planning however, is important for all organisations. Here VAO Six seems to have the most detailed plan. A *"Disaster Cabinet"* exists on each of its sites *"full of a variety of tools and items that might be needed"*. Further, there are emergency plans in place in case of a terrorist attack that make it clear whether and how to evacuate. Staff are present on site seven days a week and visitor services know who to contact in case of issues with the building for example.

When planting more greenery was raised as an adaptation strategy the responses were varied. VAO Three has a bit of greenery on the roof, but potted plants around the building were allowed to die during the summer break. A plan to plant bamboo in the main space, to counteract noise pollution, and use as an art resource did not materialise. Both perhaps symbolic of the lack of commitment to Environmental & Sustainability policy beyond the sustainability officer. VAO Seven was very enthusiastic about the idea of green spaces being used in the sector, especially if combined with the idea of community engagement. The VAO recommended that cultural organisations should pay attention to their external as well as internal spaces being sustainable and green when planning new buildings or redeveloping old ones. The idea of creating spaces that can be used as water reservoirs and public spaces was raised. Contrastingly, VAO Five made it clear that their buildings have no space for greenery and have only recently engaged in a small flower pot project with Kew gardens. It was clear from visiting the other participants offices, that planning green spaces will be mostly up to the city, therefore another extra-institutional solution.

VAO Four has made interesting small-scale adaptations to problems connected to the condition of their current building. For example, the aforementioned archive, which carries copies of prints made with artists for on site exhibitions, is mostly held in the basement. This space has drainage issues and has on occasion flooded with drain water. The organisation therefore decided to lift everything a few centimetres above the floor level, to keep the prints away from the water. A dehumidifier is brought in after the water subsides to counteract the damp. While both of these are short term solutions, they are easily doable and require no large investment. Another important part of the paper conservation effort is that members of staff regularly use the archive or the basement, and check for leaks every night before leaving the building. This level of monitoring is important. Monitoring was also emphasised by other organisations. As noted above, VAO Six monitors its buildings with a thorough check followed by recommendations every five years for the stonework, and more regular checks of roofs and gutters. This is to counteract the worry that rainwater can overflow. Measuring and monitoring the condition of the building is a first step in adaptation. The design of the new building that VAO Four will be moving into has accounted of this as part of its sustainability strategy, a clear instance where sustainability and adaptation meet. The building is listed, therefore no changes to the structure of the roof could be made, its shape had to be retained even though water tends to pool in a few of its areas. To counteract this, those areas were covered with the same materials used in swimming pools, to make sure the water does not get through. Furthermore, access to the roof is simple and safe, meaning the building manager will be able to check the roof regularly, again emphasising the importance of monitoring.

Roof leaks, perhaps as we are in Scotland and more rain seems daunting, were raised in most interviews as an issue. Again, VAO Four adopted an interim solution to limit the damage of this by custom making rain hoods for its equipment, and covering computers with plastic boxes, also emphasising checking the building before leaving. Similarly, VAO Six moves art out of a room, and can close it to visitors if there is a leak. Close monitoring of the roof and drains should make these events less common. VAO Five meanwhile sees leaky roofs as a nuisance that cannot be fixed and will have to be lived with.

Keeping collections safe and weatherproofed, energy efficient buildings appeared in four interviews. VAO Six aims to build a new collection facility according to *passiv haus* guidelines, a voluntary scheme focusing on energy efficiency that would be useful for keeping the collection in optimum temperature and humidity conditions. Furthermore, it is hoped that the design of the building will encourage sustainable behaviour of staff, making the whole process (probably, as details are not confirmed) adapted to the new climate. VAO Four is very proud of its new building which is sustainable and energy efficient. The new site for VAO Four will also encourage sustainable behaviour, for example there are no parking spaces, and members will be provided with storage spaces where they can keep their supplies, making public transportation easier the best choice. VAO Seven spoke of the redevelopment of the Scottish National Portrait Gallery in terms of designing a 'smart' adaptable building, that uses less energy but keeps the art in tolerable environmental conditions. The gallery created a natural system of air flow and self-cooling, and only uses energy to dehumidify occasionally. The building does not have issues with high fluctuations due to sudden large numbers of visitors on hot or wet days because of the volume of the space: *"the building can actually control itself"*.

A key adaptation strategy highlighted by VAO Five would be the presence of a dedicated sustainability officer, as implementation is a problem despite best intentions of the rest of staff. Perhaps this would help in driving the behavioural change mentioned by other participants. VAO Seven mirrored this remark, according to them many organisations do want to change, but do not know how to. The participant suggested creating *"design champions"*, who would help organisations see the adaptative options available to them:

"help you design systems and ways of working, and that might affect how your building looks... the money, you might need some still, but it will be different money for different things."

The participant also suggested creating a collaboration network with universities and colleges based on free exchange of information in return for "live research".

Remote work is obviously difficult in an art organisation, but the possibility of it for administration staff is an essential adaptation measure raised by VAO Six. The organisation is currently phasing in *"thin clients"* or a *"cloud"* solution that will allow staff to access files remotely, rather than being tied to one desk space. Possible uses of technology were suggested in a few interviews, but no concrete recommendations were made.

VAO Seven indicated that organisations will simply have to relocate especially if they are at consistent risk of flood:

"you have to say well, we can't stay here, cos you can't just keep building walls, you have to move to high grounds... that can be a different opportunity, going out to different communities"

Overall Trends

Overall the participant interviews revealed that not all organisations have considered the impact climate change has already had on their practice, and what effects it will have in the future. It was easiest for participants to discuss extreme weather events, and identify how those might disrupt their work, however, for most these effects were seen as a “nuisance” rather than a real danger. Whether this is because of ignorance, or fear of the uncertainty resulting in apathy remains to be seen. A knowledge-action gap or a general air of apathy and resignation was detectable in most of the interviews; some participants see the challenges as too big to tackle, given the lack of resources and finance that arts organisations traditionally experience. One participant reported that

“having super sustainable buildings, but its aspirational, but to be honest it’s never going to happen” *(VAO5)*

Some organisation have had difficulty with implementing a sustainability policy, and perhaps this has taught them to be cautious of inviting more changes. There was a clear difference in the understanding and preparedness of those organisations who had a sustainability officer, versus those who only had good intentions.

There was also a clear disparity in information reported by individual organisations and the perceptions of the sector as reported by the funding body. While many VAOs saw themselves and their buildings as vulnerable, the funding body reported little danger to its own operations or the building-based parts of the sector in Edinburgh. The funding body was positive that organisations which handle valuable works of art, as well as the majority of production facilities are in a good state, in contrast to individually run artist studios. There seems to be a disconnect in perception or reporting between individual organisations, the funding body and the research.

Recommendations

The review of secondary literature identified different types of adaptation that can be divided into two categories: managerial and practical; occasionally technological and behavioural measures are singled out *(Sesana et al 2018:5)*. Additionally, adaptation measures can be reactive or proactive. Reactive measures aim at ***"returning conditions as they were prior to the event"*** while proactive measures are a response to climate change predictions *(Sesana et al 2018:12)*. The most important adaptation measures highlighted by literature are managerial, especially those focusing on planning and behavioural change. This is perhaps understandable as practical adaptation recommendations are much more difficult, as they need to be made suitable to local conditions *(Sanderson et al 2018:1-10)*. It must be stressed that most of the practical adaptation measures discussed below will have to be combined with managerial adaptations to be fully effective.

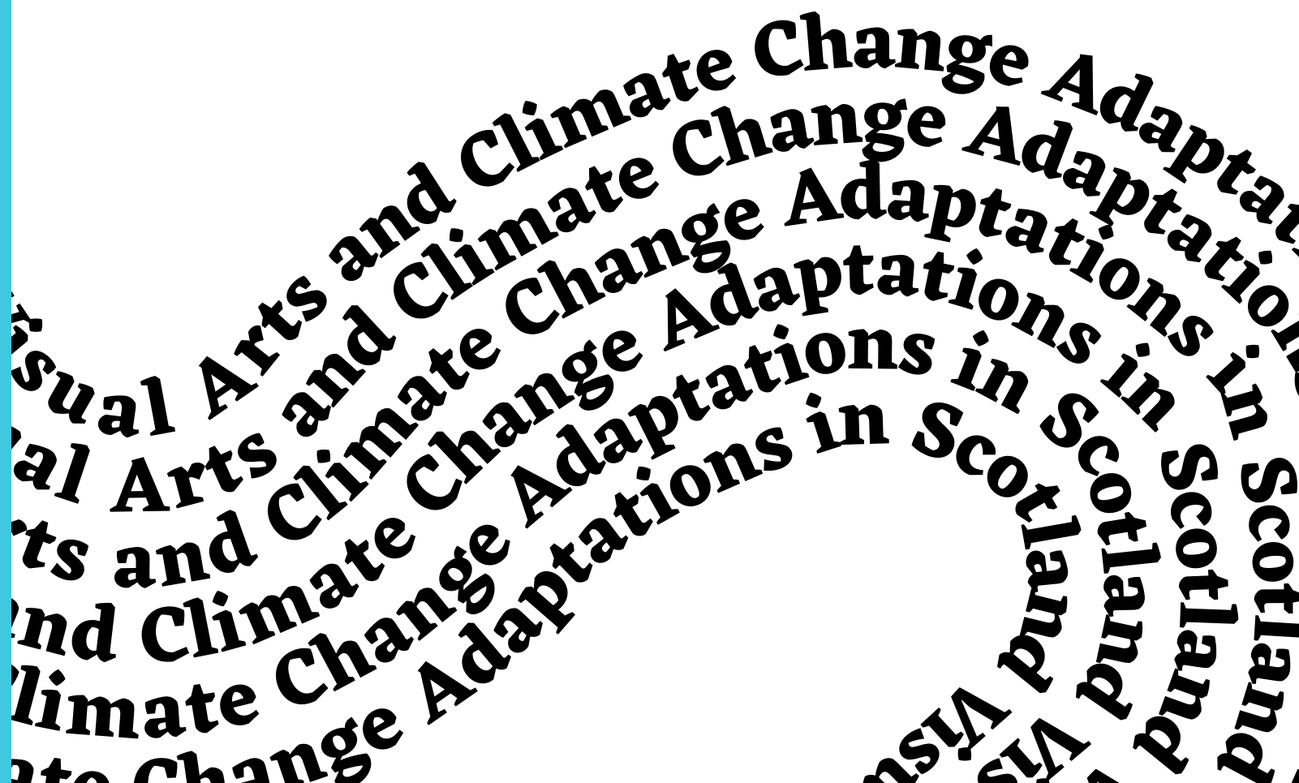
The first adaptation actions within an organisation are likely to be incremental, that is they will expand and develop existing responses to climate change. The aim is to preserve the way in which an organisation works as much as possible. However, especially where there is a lot of vulnerability to climate change, transformational adaptations may be needed *(Sanderson et al 2018:34,50)*. These are actions which ***"change the fundamental attributes of a system in response to climate and its effects"*** *(IPCC, 2014 p. 1758 in Sanderson et al 2018:50)*. Incremental adaptations can be gradually improved or built upon to arrive at transformation, but ideally organisations should aim at transformational changes. These can also be seen as interim actions: while the grander plan of adaptations is being planned, certain measures have to be implemented to prevent further damage *(Cassar 2005:62)*.

Risks and business continuity

The most basic, and yet perhaps one of the most important first steps in climate adaptation, will be the embedding of climate change in any risk planning or business continuity strategies. Respondents highlighted that this is not really the case so far. Including climate change within decision making strategies *(Sesana et al 2018:5)*, or incorporating flooding, for example, in disaster plans is seen as vital in literature *(Cassar 2005:23)*.

"Explicitly incorporating climate change as an issue" in the risk register of an organization *(Yeoman 2006:376)* should result in:

- Climate change becoming a centralized issue.
- Economic growth strategies being balanced by sustainability. Without this growth will be counter-productive.
- Integrating ***"adaptation plans with other Scottish Organizations for mutual benefit."*** *(Yeoman 2006:376)*. As adaptation is a complex process, this is a significant step towards easing collaborative approaches.



Planning

In addition, adaptation while possible to be carried out in increments cannot be effective if it is not thoroughly thought through. These planning efforts should be based on well ***"controlled assessment of risk"*** *(Cassar 2005:6)*. As the following section will demonstrate, adaptation methods will interlock and can have consequences in unintended areas. Planning must be based on assessment of the individual situation for each building *(Cassar 2005:6)*, and go beyond the physical conditions, to consider intangible consequences and the communities affected *(Sanderson et al 2018:16)*. The earlier such plans are made and implemented the easier it will be to cope with climate impacts *(Sanderson et al 2018: 49)*. Further, involving other stakeholders in the planning stages will increase the quality of the plans, as well as their social acceptability, which will ease implementation *(Sanderson et al 2018:159)*. As will be seen below, certain adaptation measures can be quite stark, therefore local acceptance will be vital for the continuing success of the VAO. Planning will be difficult as it will have to deal with uncertainties in climate projections, and "the risk of irreversible changes" *(Watson 2001 in Cassar 2005:6)*. Considering the expense of adaptation and protection measures, planning ahead is vital *(Cassar 2005:6)*, and should also help organisations avoid ***"wrong solutions"***, or ***"maladaptation"***.

Five basic steps of adaptation implementation have been identified by Sanderson:

1. Problem identification (impact, vulnerability and or risk assessment);
2. Selection of potential adaptation options;
3. Appraisal of options;
4. Implementation;
5. Monitoring and ex-post evaluation. *(Sanderson et al 2018:112)*

Economic/financial evaluation can be part of this process *(see Sanderson et al 2018, eg. 113-4)*. Especially when refurbishment, retrofit or relocation are being considered, it is important to bear in mind that these processes require astounding amounts of planning, resources and finance, and therefore take time. The refurbishment of VAO Four's new building itself took two years, the entire decision making process however, took over six. If an organisation is considering these options, it should start planning now.

Monitoring and Maintenance

Adaptation is best when undertaken at the local level, therefore monitoring current vulnerabilities becomes a vital part of the adaptation process. Actions need to be designed for the specific conditions of each building, rather than using a ***"one-size-fits-all approach"*** *(Sesana et al 2018:3)*. Surveys and collaboration should serve to establish standards and baselines for intervention and inform the planning process *(Cassar 2005:24)*. Tracking the situation is seen as a key factor in moving from reactive to proactive transformative adaptation:

"I think it would be folly to try to reproduce 'past' conditions by humidification etc. Rather, undertake the necessary monitoring and remedial interventions to make the [object] safe under the new prevailing conditions"

(Cassar 2005:2).

Not many of the participants had a system that would allow them to understand weather fluctuations and impacts on operations. Hence impressions of weather as a 'nuisance' and lack of perception of climate change, and lack of ***"baseline against which impacts... may be estimated"*** *(Sesana et al 2018:12)*. Two respondents reported a monitoring and maintenance system. One informal, where members of staff checked the building before locking up and 'patched it up' themselves, and one formal, with maintenance recommendations following in-depth inspections every five years. Only the formal one allowed the participant to see whether weather caused increasing deterioration of the building.

Maintenance follows from close supervision and recording, this can mitigate risk, and avoid future damage. Monitoring and maintenance should be concretely in place before adaptation is undertaken *(Sesana et al 2018:12)*. Here frustration in the sector focuses on the lack of available funds for continued maintenance, as grants prioritise new investments rather than ***"day-to day management... budgeting in advance is almost impossible"*** *(Cassar 2005:36)*. This is simply unsustainable, and professionals in the field have argued that the current funding structure ***"promotes poor maintenance"*** *(Cassar 2005:36)*. A key to future successes is therefore a transformation of funding structures by governmental and funding organisations.

Audits and evaluation should also be carried out after any adaptation measures are implemented to measure their impacts, and understand any further challenges *(Julie's Bicycle 2015: 41)*

Behavioural Change

Perhaps the biggest adaptation challenge will be the immense change in how we think about the climate, and how we live our lives and use our cities. As already hinted at, adaptation is not about preserving our society and organisations as they are now, but transforming them to work better in the future climate while affecting many socio-economic aspects. The importance of changing behaviours and mindsets at all levels of an organisation is constantly highlighted in climate change literature. The managerial level will have to embrace the ideology to initiate the changes, while the staff and the public will have to understand their importance to achieve the desired results. Problems begin where there is no dedicated sustainability officer within an organisation, who can devote their time to persuading organisation leadership about the essential nature of adaptation.

The Visual Arts sector has a lot of work to do here, as illustrated above in the section on attitudes to adaptation and mitigation. Most organisations are still focused on mitigation and sustainability, and some see adaptation as giving up. For many, the very way they operate will need to be modified, a reality not many are considering right now.

A key piece of advice in communicating these issues is that all adaptations should be considered positive changes as ***"society should not object to actions that create a better world"*** *(Holman 2016:106)*. Adaptation is often connected to creating a more equitable society and increasing social resilience, rather than detrimental alterations *(Holman 2016:105)*. Further, connecting to values already held by audiences and stakeholders should result in greater motivation towards adaptation, and better results. On the other hand, the relationship with values is problematic as:

"differences in values may create tensions or discrepancies between adaptations that are deemed rational and effective by governments and planners, and those that are considered important and desirable by individuals and communities" *(Adger 2013:114).*

This highlights that in many ways adaptation is a ***"social process"*** *(Adger 2013:114)*, and emotions will run high, emphasising the complexities of the task and the importance of thorough planning. The uncertainty of climate change projections is often used to dismiss the need to prepare. Many people do not disagree that global warming happens, but are either unaware of it already having an impact, or perceive it as a non-threatening and distant in time and location. It is therefore important to emphasise that the changes are certain, it is the timescale at which they will happen that is not *(Corner 2015:13)*. Other techniques of sharing the adaptation message may include emphasising ***"that losses might not happen if preventative action was taken"*** *(Corner 2015:13).*

Financial

Funding organisations and bodies in strategic positions are encouraged to create climate change related grant opportunities. Those responsible for overviews or funding the sector must increase their responsibilities and role in terms of resilience and risk. As mentioned already the current funding framework makes budgeting for maintenance and weather related impacts almost impossible, and organisations are often penalised for under- spending. Instead organisations should be allowed to build contingencies into their yearly budgets. Furthermore, the creation of a ***"bail out fund"*** could be an effective way to provide compensation for unforeseen financial losses or building damage related to climate change impacts. The overseeing bodies should increase their knowledge of climate change adaptations and the vulnerabilities and dangers the whole sector is exposed to. They could become a key node in keeping the sector more alert and a significant driver of behavioural change.

Weather Impacts

The impact of water seemed the main worry and consideration of most participants. Water can pose danger in the future through increased rain and related pluvial and fluvial floods. Dealing with the onslaught of water will therefore be a key challenge. There are a few possible considerations here. Firstly, the danger of flooding must be assessed at a local level: fortunately SEPA has released Flood Risk Management Strategies *(SEPA 2015)*.

"For priority areas within each district (called Potentially Vulnerable Areas) there is a description of the causes and consequences of flooding; the agreed goals or objectives of local flood risk management; and the specific actions that will deliver these actions over the short to long term"
(SEPA 2015)

SEPA is also in charge of Floodline, a free flood alert system. Similarly, Glasgow's resilience programme plans to *"mitigate flood risk"* as part of its aims to *"tackle the local impacts of global climate change"*, by working with *"the natural water cycle"*, using Rotterdam as an example. The Dutch city has constructed a plaza, a recreational space, were excess surface water is stored during times of heavy rainfall creating an *"urban pond"*. The water is released once the city system can cope with it. While this is an example of city-scale adaptation, similar run off areas might be a good idea for organisation in Potentially Vulnerable Areas identified by SEPA. The collection and storage of rainwater were mentioned by VAO Three, which uses collected rain water in its building, and a few European Case studies *(eg. BlueAP 2019)*.

Another key adaptation measure identified by both participants and literature is the importance of updating drainage and pipes, also part of the Glasgow resilience plan *(Glasgow City Council n.d.:62)*. Drainage is a special problem for those organisations housed in historical buildings, as their gutters are unable to cope with increased rainfall *(Cassar 2005: 34)*. There is a possibility that drainage systems will have to be updated in a scheme that does not preserve the outside of the building, and be more invasive than current methods of upkeep, therefore interfering with the listed status of the building *(Cassar 34, 43)*. This will have to become part of the adaptation conversation, as compromises on what to preserve will have to be made. A radical adaptation strategy might be abandonment of buildings that are at risk of flooding, especially if no funds to make them fully flood resistant are available *(Sanderson et al 2018:26)*. Most flood prevention strategies are city wide and need to be taken up by the local authority, but this does not mean that Visual Arts organisation do not need to worry about this. Impact of water on fabric of buildings, and collections preservation will be considered in a separate section below.

Contrastingly, perhaps due to Scotland not having a great reputation for sunshine and heat, concern about increased warm weather did not feature in many conversations. However, the predictions show Scotland will get considerably warmer in the summer, and countless buildings are not prepared for this. Even many modern or refurbished buildings do not have cooling capabilities, or have ineffective ventilation systems *(VAO Three, VAO Five)*. Urban Heat Stress will become more of a factor *(Sanderson et al 2018:88)*, creating difficulties for mitigation attempts. Most adaptation measures take the form of heat reduction in this matter, which can be done in two quite simple ways. The planting of green spaces, roofs, trees and even water elements has been shown to provide shade and help the Urban Island Effect *(Sanderson et al 2018:115)*, as well as providing visitors with recreational spaces they can enjoy. New green spaces can also minimise surface flooding risk as the plant roots help soak up water, while contributing to cooling and insulation *(Julie's Bicycle 2015:21)*.

An innovative solution to the problem of increased heat is the use of light-coloured pavements and wall paint *(Sanderson et al 2018:115)*. These of course have different effectiveness and costs depending on the infrastructure already in place, but they are also a mitigation measure, therefore worth investing in from an ethical point of view. There are also measures aimed at hazard reduction i.e. making sure people will not be hurt by the heat. This took the form a heat warning system in Madrid, and a health campaign for UV protection in Cornwall *(Sanderson et al 2018:115)*. This could be especially important in Scotland as its residents are not used to the idea of harmful heat. As tourism rates are projected to substantially increase: *"Pressure of increased tourism on tourist hotspots"* will have to be better planned for, as tourist attractions may be unable to meet demand *(Yeoman 2006:375)*, even if heat is not seen as an issue yet *(VAO One)*. This has implications for historical buildings. *"[N]eutral density window films for light control and introducing shutters and blinds even where there is no historical precedent"* might be a good adaptation idea *(Cassar 2005:25)* but could conflict with the listed status of a building.

Disrupted Travel

The effect of extreme weather events and intense weather on transport infrastructure was discussed by many participants as a considerable vulnerability. The ability of things and people to travel across Scotland and internationally will be affected. As this depends on the extra-institutional, the main adaptation method will be lobbying local councils and governments *(Sanderson et al 2018:50)* to weather-proof transportation links.
In the interim, planning, and secondary arrangements will become a key strategy; some participants have suggested that art can travel for events well in advance to be set up. In the case of events, organisers must have protocols and contingency plans for situations where an element of the event does not show up on time. A bigger problem will happen if restrictions on air travel are created, or if the price of air travel starkly increases. In that case creating international art events will be substantially more difficult. This is another area where compromises and changes in organisation behaviour are necessary.

Historic Buildings and the Weather

The issue of heat and moisture on historic, listed, or simply old buildings is a key concern of many in the visual arts sector.

"Historic building materials are extremely permeable to the environment of air and soil; changes in moisture content can occur rapidly, and these can activate damaging cycles of salt crystallisation. Old rainwater goods may be unable to cope with changed patterns of rainfall, and acute events such as flooding have much worse and longer-term effects on historic than on modern buildings." *(Cassar 2005:6).*

The good news is that most of the participants interviewed were aware of such challenges. The bad is that retrofitting historical buildings and aspiring to the BREEAM or the *passiv haus* guidelines can be prohibitively expensive *(VAO Three)*. This is often further complicated by the listed status of the buildings as reported by many participants.

"How do the indoor air conditions and the envelope of buildings with temporary use react to different heating and ventilation strategies?"

is a question which the project *"Climate for Culture"* aimed to answer, creating a model of indoor climate and energy demand in historic buildings. The model took into consideration interactions of humidity and temperature (hygrothermal), thus the fabric of buildings, their uses, and their contents, e.g. paintings and cultural objects were part of the calculations *(Leissner 2015:1,11)*. The study warns that certain: ***"heating systems may not be appropriate in future summer periods when both indoor temperature and absolute humidity rise."*** *(Leissner 2015:12)*

The project also aimed to measure the impact of human presence in historic buildings, asking: ***"How much ventilation and additional heat energy is required to ensure safe indoor conditions for cultural heritage when a historic building is exposed to extreme climate conditions or up to thousands of visitors per day?"*** *(Leissner 2015:11)* and the resources produced can be consulted when planning building adaptation.

There is some disagreement in recommendations on whether to make buildings "dry proof" or "wet proof". While bearing in mind that retrofitting is usually very costly, organisations need to decide whether they aim to prevent water from entering the building, so called "dry proofing" or make sure that when it does enter the building it does no harm, called "wet proofing". Relocation of vulnerable objects can also be considered *(Sanderson et al 2018:179)*. Some experts warn against the idea of "dry proofing", or 'moisture barriers' as water will always find a way in, especially in a historic building. Further they can make it more difficult to control humidity in the building.

"Water always finds a way to come inside...If there are cracks inside the wall. At the bottom of the wall, water can be dragged on by capillary action. If it is an inhabited building then you have internal humidity and if you use water repellent barriers on the inside and it is not properly ventilated it keeps the water inside... historic buildings cannot work with barriers, because it keeps the problems much worse." *(Interviewee in Sesana et al 2018:11)*

Further, post flood drying is critical, as highlighted by one participant, as it decreases the danger of mould *(VAO Four)*. It is also vital both for the structure of the buildings, and the collections held inside. This must be made part of any disaster plan *(Cassar 2005:23)*. For arts organisations that display art, proper ventilation is key to controlling levels of humidity.

There are obvious challenges in retrofitting buildings. There is a considerable interaction between the different climate change impacts, and a conceivable risk of maladaptation *"because of the uncertainty of existing data and research, the complexity of interactions, and possible conflicting priorities and values" (STBA)*. Fortunately, there are tools to counteract this. The BREEAM and *passiv haus* buildings standards were highlighted by two participants as reliable goals in refurbishments and retrofit.

Collections Care

The primary adaptive measure for collections care is effective building insulation and ventilation, which will reduce temperature and humidity fluctuations, and will allow for energy efficient control of the internal environment. For many VAOs preservation of old, fragile objects is an essential part of operations, governed by the British Standard BS 5454: 2000 *"Recommendations for the Storage and Exhibition of Archival Documents"* and the PAS 198:2012 *"Specification for managing environmental conditions for cultural collections"* *(Julie's Bicycle 2015:13, 28)*. Recently (2014) the European Committee for Standardization released the CEN/TC 346, a set of guidelines on the Conservation of Cultural Heritage *(CEN, n.d.)*. Organisations will need to strive to find balance between those requirements, resilience of their buildings and the comfort visitors are used to. A retrofit project at the Whitworth Art Galleries adopted a "high level heating and ventilation strategy using passive approach" *(Julie's Bicycle 2015:12,13)*. It was decided that temperatures between 16-28 °C and relative humidity between 30-70% were the correct conditions for that particular collection, accentuating the necessity of individualistic approaches. Together with other retrofit measures this has resulted in more resilient buildings, however the galleries are now cooler in the winter and warmer in the summer: a compromise that was anticipated and accepted. Practical adaptations were combined with behavioural changes, such as ensuring the staff know in advance what the conditions in the galleries are and clear communication with visitors *(Julie's Bicycle 2015:12-13)*. This is exactly the kind of adaptation compromise which will become common.

Minimising energy use is an important mitigation measure, which also increases the resilience of a building, as extreme weather events are likely to disrupt energy supply. The standards of passive design which minimise energy use, are encouraged as one possible measure. In the interim, before retrofit or relocation can be embarked on, or while considering adaptation possibilities, changing an energy supplier to renewable energy is an elementary mitigation measure. Alternatively, minimising energy use in other areas of operations, i.e. spaces that do not hold fragile collections, and allowing for small fluctuations in galleries are good options. A transformational adaptation consideration might be the installation of the organisation's own renewable energy sources on site.

Another key solution in collections care is consolidating all stored collections into one space. Many VAOs which have large collections in storage keep them in separate buildings. It is essential to store them in one space, where the climate can be controlled more easily. Current collections space may also be adapted to better manage climate impacts in the short term. One participant reported that the raising of all archival cabinets a few inches above floor level, aided their conservation. Constant monitoring of storage space, whether by systems or people, is also essential.

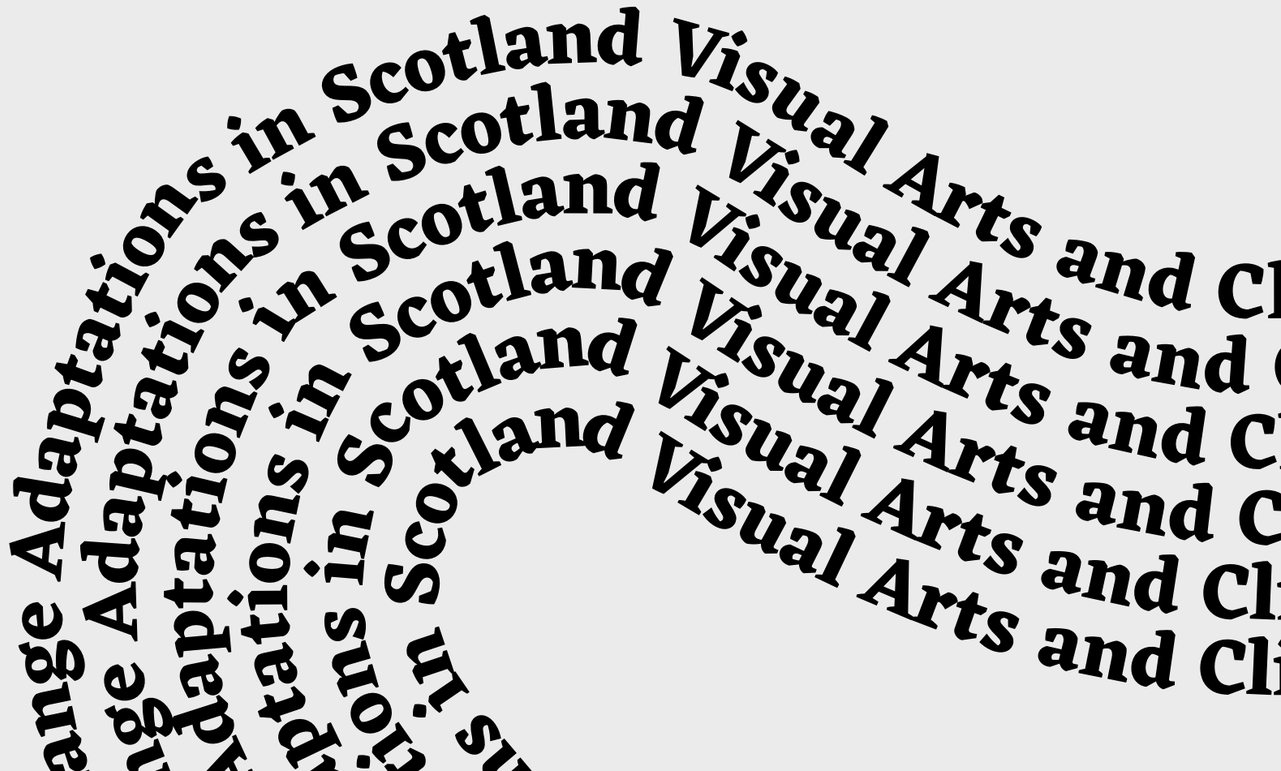
Once again it should be highlighted that Scotland will also have more sunshine in the summer than perhaps many collections are used to. It is essential to adapt to this either through special blinds, or solar control glazing. Monitoring of the levels of exposure to sunlight will become essential (Julie's Bicycle 2015:13).

Staff Preparation

The increase in heat will also impact visitor numbers and visitor care. Staff should be prepared for new work conditions, for example spaces and people overheating. Appropriate training and knowledge dissemination should be in place about the wider impacts of climate change, and any disaster protocols which are in place. As mentioned above, climate change should be part of risk protocols, and each organisation should have emergency plans connected to different kinds of extreme weather events, especially if the safety of visitors can be at risk. It is therefore essential that each organisation understands impacts particular to itself. Sustainability and adaptation policies should be communicated and embraced on all levels of organisations.

In the case where an organisation does not have a sustainability officer, the appointment of one is highly recommended, to facilitate and enforce these policies. Interviews revealed that even where such policies and preparations exist, staff is often unaware of them. It is important to instil resilience in people as well as buildings, through good organisational communication as a start.

Two significant adaptation measures are enabling staff to work remotely, and an effective communication system. Both require staff awareness of the proper protocols in place. The use of a remote access software is one way of facilitating remote work. For some organisations this will require adaptations to the way of working, and flexibility about space of operations. A robust communications system must be prepared for energy and network disruption and should probably not rely on email.



Cultural Stasis

There is of course the possibility, already hinted at above, that neither retrofit nor continued maintenance will be possible, and abandonment of the site or building will be the only solution. Fourteen years ago a report for English Heritage warned:

"The 'save all' approach to the historic environment needs to be re-evaluated. It is not realistic to conserve anything forever or everything for any time at all" *(Cassar 2005:1).*

For organisations that have more than one site, or those with limited funds, difficult decisions will have to be made. Adaptation does not intend to preserve the current state of existence, as in many instances this will not be possible *(Sesana et al 2018:2)*. Both the public and visual arts professionals will have to accept that cultural heritage cannot be held in stasis *(Cassar 2005:34)*, abandonment of sites, compromise of venue facades, or invasive preservation methods might be considered.

There is a society-wide need to understand that adaptation requires systemic change, therefore adjustment of the concept and criteria associated with listed buildings status, might become a key recommendation. As the most recent IPCC report explains:

"There are limits to adaptation and adaptive capacity for some human and natural systems at global warming of 1.5°C, with associated losses... The number and availability of adaptation options vary by sector." *(IPCC 2018 B6).*

While we should be enthusiastic about adaptation, we must also recognise that not all "human systems" have adaptive capacity, and that adaptation will not fully preserve past conditions.

Other practical possibilities

A review of current literature on cultural heritage and climate change risks in Europe identified the following as most practical adaptation possibilities:

- using roofs and shelters to protect unroofed sites
- upgrading roofs and drainage systems,
- avoiding the use of incompatible repair materials and surface treatments
- moving the heritage sites
- monitoring the heritage assets and the climatic conditions
- use of digital recording *(Sesana et al 2018:5)*

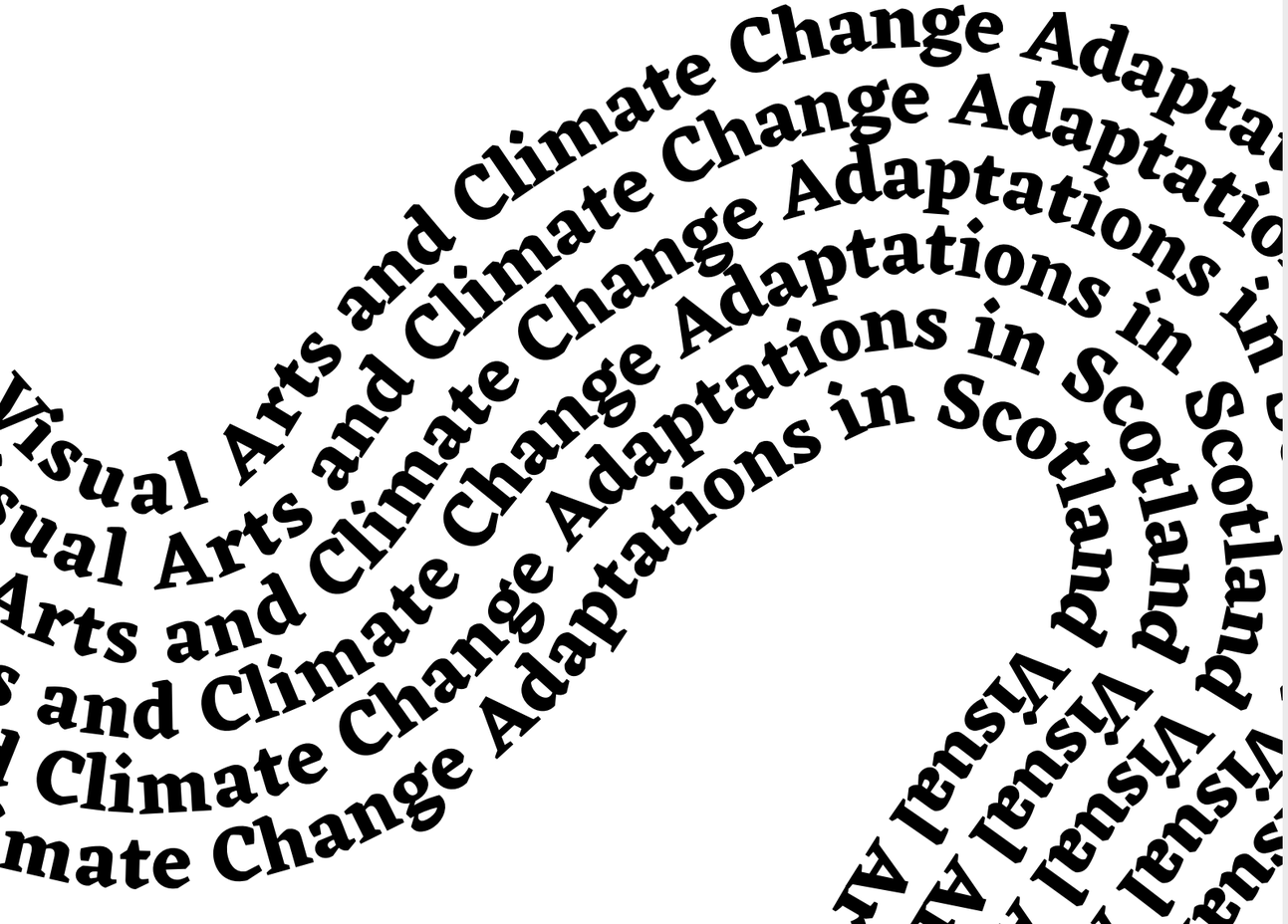
Adaptive Capacity and Barriers

Starting to adapt as an individual organisation can be difficult. It should be facilitated by an understanding of organisational adaptive capacity *(Philips 2015)*, its current situation and vulnerabilities.

The *"key determinants"* of adaptive capacity can be summarised as:

"information, authority, resources, cognitive factors, leadership and learning capacity" *(Sesana et al 2018:2)*.

Fundamentally, the ability of an organisation to adapt is determined by the information on climate change that is available to it. The attitude of leadership, and access to resources, as well as "learning capacity" are also key. Through identifying barriers to its adaptive capacity, it should be easier for organisations to target the factor that is stopping the progression of the adaptation process. Most barriers to adaptation fall into one of three categories: institutional, technical and financial. The first requires behavioural and attitude change, the second and third access to information, and structural changes in funding bodies.



Maladaptation

If transformative or interim adaptations are carried out haphazardly they can have unintended detrimental consequences. An illustrative case study of German flood defences shows the complicated context of resilient action.

"After the first big flood in 2002, damage in Saxony, Germany, amounted to around 6.2 billion EUR... After 2002, a huge investment program in flood protection was implemented" *(Sanderson et al 2018:25).*

This meant that after the next flood, in 2013, damages were much lower (1.9 billion Euro). Due to the flood defences being planned on a local level however, events downstream were not considered. The Saxony adaptations

"may have raised damage downstream in Saxony-Anhalt in 2013, as there was not so much 'retention' in Saxony anymore, and Saxony-Anhalt itself had not invested much in flood protection" *(Sanderson et al 2018:25).*

causing more flood damage than it had endured previously (Sanderson et al 2018:25). Such cases are a warning that while adaptations need to be made at the local level, the full context should always be investigated.

Additionally, adoption of wrong solutions, especially for historic buildings, could decrease *"the aesthetic and architectural value of the resource"* which will lead to less tourist interest, causing decrease in economic and social value. Smaller funds will obviously be problematic, but so will lack of local interest in protecting the site *(Sesana et al 2018:15)*. This highlights the need to involve local communities, not necessarily in the planning stages, but in understanding and embracing adaptive transformations.

Reflections

The lack of attention, knowledge, planning and preparedness for impacts of climate change in the sector is striking. This somewhat reflects the wider situation of adaptation within society and environmental sciences.

Visual Arts organisations are not alone in their struggles in climate change adaptation.

Perhaps because it is seen as 'giving up' there is much less attention paid to adaptation in the sector and academic literature. Sesana reflected that:

"Current research is limited to: guidelines and recommendations, identification of the determinants of adaptive capacity, and identification of the barriers of adaptation" *(2018:2)*

Essentially published resources are limited to expressions of the need to adapt and identifications of opportunities and barriers, but few actual adaptation measures are being discussed in detail. This report encountered similar problems. One of the key tenets of adaptation is the need to apply it at a local level, as universal or top-down methods have limited effectiveness *(Sanderson et al 2018:1-2)*. Most government and academic publications which focus on Scotland, also only include general guides. Many simply include plans to plan. Another issue is the focus of most resilience discussions on agriculture, floods and bio-diversity. This state of affairs is slightly surprising given that:

"Scotland has passed the most ambitious climate change legislation anywhere in the world and to ensure that we [SEPA] play our part in delivering Scotland's targets we are committed to a climate change visions that guides our action." *(SEPA Sustainability Report, n.d.:2)*

There is a general lack of understanding/denial of climate change impacts.

Informal conversations during a 'Green' event for the arts revealed a similar phenomenon. Many are focused on recycling and sustainability and there is a general absence of adaptation knowledge and understanding. Even in the face of flooded buildings, or snowed in offices, many simply declare such events a nuisance and seem to have no awareness of their connection to climate change, or the fact they will get more severe. This level of denial and ignorance is quite concerning. Anecdotes revealed that organisations which were aware of the dangers had no plans to become more resilient, or even plans to make plans. Even within organisations which are interested in climate change there is little interest or recognition of adaptation or resilience.

Very little activity is currently taking place – when it is an urgent concern.

Overall, the general impression through the scouring of literature, interviews and anecdotal evidence is that the sector is not prepared, and many have the attitude of "let's cross that bridge when we come to it", not noticing that they are indeed already on the bridge. Impacts of climate change are unavoidable, but rather than transform how we live our lives, many deny the problem or choose to focus solely on mitigation. This is part of a larger societal problem in attitude to sustainability and climate change.

There is poor integration of sustainability personnel resource.
Another surprising element was the separateness of sustainability officers (where they are present) within their organisations. There is little integration of the sustainability officer or policy into everyday processes, in all except one organisation. While adaptation needs to have the backing of key individuals in power wielding positions, this can only happen if climate change is not seen as a separate subordinate issue, but fully integrated into the rest of the organisation and its operations.

Most VAOs underestimate the impact of heat.
One a more amusing note, the fact that heat did not seem to be a problem to the sector fits, it seems to me, with a wider popular attitude of the UK that warmth is good. Many are not yet aware of the problems this will bring. There are already anecdotal reports of visitors fainting in historical museums in the south east due to dehydration, etc. There is a need to prepare for this that not many are aware of.

Those who are enthused to take action are suffering from information overload.
A key obstacle felt keenly by the researcher and highlighted by one of the participants is the proliferation of organisations and publications that deal with the topic of climate change and adaptation. The interviewee expressed their exasperation at the fact that even if they wanted to learn about adaptation they would not know where to start.

The researcher feels a similar sentiment, having spent weeks on the project it is not felt that even the surface of the available resources has been scratched. How is an organisation which does not even have a sustainability officer to deal with this?

Compromise is necessary.
Finally, the biggest realisation after writing this report is that humans will have to change the way their societies operate, but currently no one is willing to compromise. Many (in the sector and outside of it) are looking for financial ways to preserve current ways of life, or hoping that science will swoop in at the last minute and make all the carbon emissions disappear. Neither of these are likely to happen.

Further Resources

General

- Fit for the Future Network: *https://www.fftf.org.uk/home* *"We connect the hundreds of environmental practitioners from within our member organisations so they can share best practice and practical solutions."*
- Julie's Bicycle Fit for the Future 2015 see for interesting case studies. *https://www.juliesbicycle.com/Handlers/Download.ashx?IDMF=e61a13f5-245b-45f2-ab9f-466a93d9afa9*
- Climate Adapt: Sharing Adaptation Information Across Europe. Good database of case studies. *https://climate-adapt.eea.europa.eu/*

Climate Change Science

- UKCP18, Range of Resources: See the UKCP18 overview slide pack for more info: *https://www.metoffice.gov.uk/binaries/content/assets/mohippo/pdf/ukcp18/ukcp18-overview-slidepack.ff- compressed.pdf*; Also refer to factsheets for more details on specific effects: *https://www.metoffice.gov.uk/research/collaboration/ukcp/factsheets*
- Sniffer, Climate Trends Handbook, for past changes of the climate in Scotland: *https://www.sniffer.org.uk/climate-trends-handbook-for-web-pdf*
- IPCC 2018 Global Warming of 1.5°C *http://www.ipcc.ch/report/sr15/* see summary for policy makers for overview.

Buildings

- Historic Environment Scotland: a range of publications, especially INFORM Guides, Technical Papers, see also for EFFESUS PROJECT *https://www.historicenvironment.scot/archives-and- research/publications/?publication_type=36*
- *"The EFFESUS software tool is being developed to support decision making processes for the location of specific retrofit of historic buildings and districts"* (Erikson et al 2014:132) *http://www.effesus.eu/*
- Climate for Culture *https://www.climateforculture.eu/index.php?inhalt=home*, *"the aim is an improved assessment of the climatic functioning of historic buildings and their future energy demand using whole building simulation"*
- Designing Buildings Wiki for regulations and legislation: *https://www.designingbuildings.co.uk/wiki/Environmental_legislation_for_building_design_and_construction*
- STBA Responsible Retrofit Guidance Wheel: *http://responsible-retrofit.org/wheel/*. Also check other STBA resources. *"The Wheel has been designed to address such issues by clearly identifying different benefits and concerns pf retrofit, by referencing the most relevant and accurate information, and by providing a systemic and holistic approach to retrofit design, application and use. The Wheel is both an aid to decision making and a way of learning about traditional building retrofit."* STBA Responsible Retrofit Knowledge Centre and Guidance Wheel: About *http://responsible-retrofit.org/wheel/*
- UKGBC Green Building Council for sustainable built environment resources *https://www.ukgbc.org/*
- BREEAM: the world's leading sustainability assessment method for masterplanning projects
- infrastructure and buildings *https://www.breeam.com/*

Monitoring & Evaluation

- LCLIP: Local Climate Impacts Profile, allows organisations to measure their vulnerability. Guide to decision making. *https://www.ukcip.org.uk/wizard/current-climate-vulnerability/lclip/*
- Adaptation Scotland, many resources. Start here: *https://adaptationscotland.co.uk/how-adapt/our-adaptation-process*
- Floodline: *http://www.floodlinescotland.org.uk/*
- FRMS, Flood Risk Management Strategies: *http://apps.sepa.org.uk/FRMStrategies/*

Behavioural Change

- The Uncertainty Handbook: A Practical Guide for Climate Change Communicators: Very Useful and accessible guide. *"12 practical and easy-to apply principles for smarter communication about climate change uncertainties."* *https://climateoutreach.org/resources/uncertainty-handbook/*
- Climate Visuals: provides images and advice on how to communicate using them effectively *https://www.climatevisuals.org/*
- Climate Outreach: guides on *"values based communications"*, includes the need of *"breaking out of the green ghetto"*. *https://climateoutreach.org/resources/communicating-climate-change-adaptation-a-practical-guide-to-values-based-communication/* Also guides on communication science, and engaging the centre-right.
- IEMA: Climate Change Adaptation, Building The Business Case. *https://www.iema.net/assets/uploads/CCA%20Business%20Case%20Guidance%202013*

Financial Resources

- Julie's Bicycle Fit For the Future 2015. Appendix 5 (p.56) Funding and Financing Sources for capital investments, energy efficiency, energy installation, sustainable construction, refurbishment or refit projects. Be aware that the document was published in 2015, therefore some links are no longer live.

  https://www.juliesbicycle.com/Handlers/Download.ashx?IDMF=e61a13f5-245b-45f2-ab9f- 466a93d9afa9

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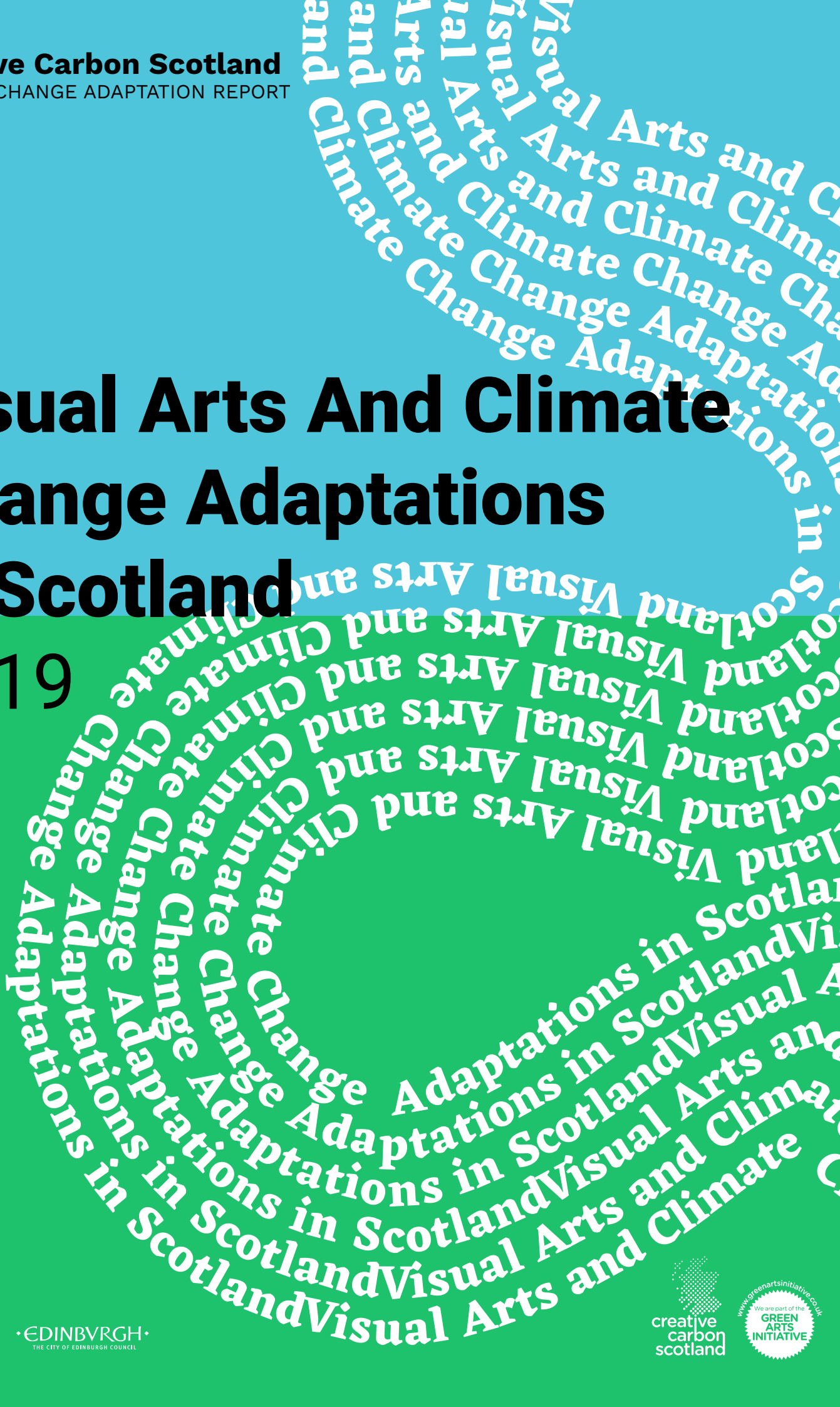

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