

**U. PORTO**



FACULDADE DE BELAS ARTES  
UNIVERSIDADE DO PORTO

# **Public Glass Art in Portugal and Iran: The Development of Approaches Based on Contemporary Contextualization**

Parinaz Alsadat Faghihi

Dissertação para obtenção do grau de  
Doutoramento

Supervisors: Teresa Almeida  
Fernando Quintas

**Porto, 2021**



PhD under the grant: SFRH/BD/102977/2014

**O Júri / The Jury**

Doutor

**Presidente /President**

Doutor

**Vogais / ExaminersCommittee**

Doutor





## Acknowledgment

I am very grateful for the years of guidance from my supervisor, Professor Teresa Almeida who kindly encouraged me to explore the directions of my research. I would like to express my most profound appreciation for her expert guidance and support in all stages of my research and especially for helping me where I couldn't communicate in Portuguese. I also would like to thank my co-supervisor, Professor Fernando Quintas for his expert guidance, valuable criticism and comments as well as kind supports. Without my supervisors, this research would have been incomplete.

I am extremely grateful to the Foundation for Science and Technology (FCT) that supported my research during my PhD under the grant SFRH/BD/102977/2014. Thanks also to the Faculty of Fine Arts, University of Porto, and the Research Unit VICARTE (Glass and Ceramic for the Arts) at the Faculty of Science and Technology of NOVA University of Lisbon for providing space and technical supports for me to do the research, to experiment, and to make the samples for the creation of the practical project for my PhD.

I am also thankful to Prof. Lucia Matos, Prof. Bernardo Pinto de Almeida, Prof. Heitor Alvelos, Prof. Gabriela Vaz Pinheiro, Prof. Adriano Rangel and Prof. Francisco Laranjo, for their endorse.

I wish to express my gratitude to Prof. Susana Piteira for her supports and advice on my public glass art project. Thanks also to AGTTM and Nemoto, sponsors of my project for providing the luminescent materials for making samples for my PhD project. I would like to thank Tânia Rosa, director of Marinha Grande Glass Museum for helping me with information gathering about Marinha Grande and the main concerns of the city. I also want to thank Dr. Hossein Kamalpoor for his consultation as an architect for my PhD project. Thanks to Joana Silva, coordinator of Cencal, for her technical advice.

My sincere thanks go to Masoumeh Nobarany for her diligent, impressive, and professional English proofreading of my thesis.

I would like to thank to my interviewees, Dr. Cate Watkinson, Dr. Vanessa Cutler, Dr. Kevin Petrie, Dr. Jeffrey Sarmiento, Dr. Jessamy Kelly, Andrew Moor, Louis Thompson, Dr, Teresa

Almeida, Dr. Fernando Quintas, Joana Vasconcelos, Dr. José Frade, Dr. Fernando Carradas, Conceição Cabral, Alexandra Abreu, Joana Silva, Dr. Inês Coutinho, Daniela Pinheiro, Joost Van Santen, Dr. Arezoo Khanpour, Hayas Hosseini, Saeed Golkar.

I would also like to thank all of my friends and colleges during PhD courses, Bruno Pereira, Fátima São Simão, Telmo Castro, Patricia Wielewicki, Marta Calejo, Conceição Abreu, Orlando Vieira, Carlos Coelho Costa.

I am indebted to my husband Vahid, who as an inspiration to me, encouraged me, and provided emotional support to keep my educating going and get a PhD. This work would not have attained flourishing without his help. I would like to apologize to my lovely daughter Niki if I was not always available, but my love for her made me continue and accomplish this PhD. And finally, I would especially like to thank my amazing parents for the love, support, and constant encouragement I have gotten over the years. In particular, thanks to my sister, Parisa who always trusted, encouraged, and supported me to continue my education and artistic life.

# Abstract

Public glass art is a public artwork that is essentially made of glass. Transparency, translucence, and brightness, important characteristics of glass, have made it a multifaceted material able to demonstrate image continuous transformation and reflections, depending on climate variations and the movement of the sun. Glass art reveals the great potential to produce innovative artworks and heritage enjoyment by the public; however, glass apparent fragility has impeded most artists to employ it in public art projects. These distinct properties of glass attracted our interest in doing this research, promoting innovative approaches to enhance and create glass artworks in public spaces.

In this thesis, we first study public art and its challenges and discuss the concept of space, place, and public space. We then study glass art in public spaces and draw a distinction between three categories: 1) architectural glass art, 2) sculptural glass art, and 3) public glass art. We focus particularly on public glass art in the contemporary urban context and identify the traditional and recently conceived and developed glass art techniques, that can be used in the creation of glass artworks in public spaces.

Focusing on our main subject for this thesis, we study Portugal, the country this research has been conducted, and Iran, the country the principal researcher comes from, as countries that have long traditions in glass and glass art, thought with slow progress achieved in public glass art. We also study Great Britain as one of the pioneering countries in public glass art, where several artists have successfully executed glass artworks in public spaces and reason out the key factors in boosting public glass art in this country. We also argue that glass art and glass artists have been strongly influenced by the quality of glass art education, instructors, technicians, and university lecturers. To attest to this statement, we conducted several interviews with artists from these three countries.

The characteristics of glass makes it vulnerable to vandalism. This poses serious challenges to artists who intend to create glass artworks in public spaces. We study several approaches, from safeguarding techniques and educational programs to legal anti-vandalism and criminal

mischief laws, that can effectively reduce vandalism, presenting successful and unsuccessful case studies of public glass art.

Finally, we present a public glass art project proposal, called *Discovery Sails*, that demonstrates and reflects Portugal's golden centuries of discoveries, when Portuguese seafarers were exploring the world with their sailing ships. We propose the novel idea of using luminescent stones and luminescent glass frits as eco-friendly materials that absorb the energy from the sun and glow in the dark. This project is designed for the execution and installation in the vicinity of the Glass Museum in Marinha Grande.

Our research proved that glass, besides its functional characteristics, could perfectly be used in the creation of public projects with innovative purposes, based on inventive conceptual approaches. In this sense, not only education but also financial support, as well as the economic and political status of a country, could influence the improvement of public glass art.

**Keywords:** Public art, Glass art, Public glass art, Glass art education, Vandalism.

## Resumo

A arte pública em vidro é uma obra de arte apresentada no espaço público feita essencialmente em vidro. Transparência, translucidez e brilho, características fundamentais do vidro, tornaram-no um material multifacetado capaz de versatilmente apresentar uma contínua produção de imagens e reflexos, dependendo de alterações climáticas e do movimento do sol. A arte em vidro apresenta um grande potencial, a ser aplicado na produção de obras de arte inovadoras e na sua consequente fruição pelo público; no entanto, a aparente fragilidade do vidro tem-no impedido de ser utilizado pela maioria dos artistas em projetos de arte pública. Distintas propriedades de vidro atraíram o nosso interesse e levaram-nos a desenvolver esta pesquisa, concebendo abordagens inovadoras potenciadoras da criação de obras de arte em vidro em espaços públicos. Nesta tese, estudámos inicialmente a arte pública e os seus desafios, e abordámos o conceito de espaço, lugar e espaço público. Estudámos arte em vidro em espaços públicos e traçámos uma distinção entre três categorias: 1) vidro artístico com aplicação em arquitetura, 2) vidro artístico escultórico, e 3) arte pública em vidro.

Focámo-nos particularmente na arte pública em vidro no contexto urbano contemporâneo, relacionando técnicas tradicionais com as mais recentemente desenvolvidas e aplicadas em vidro, e que podem ser usadas na criação de obras de arte em vidro em espaço público. Centrando-nos no tema principal desta tese, estudámos o caso de Portugal, país onde esta investigação foi conduzida, e o Irão, país de onde provém a investigadora principal. Ambos os países têm longas tradições na arte do vidro, embora com progressos mais lentos na arte pública em vidro. Estudámos igualmente a Grã-Bretanha, um dos países pioneiros na arte pública em vidro, e onde vários artistas executaram com sucesso obras neste contexto, e explicamos os fatores-chave que impulsionaram a arte pública em vidro neste país. Defendemos que a arte do vidro e os artistas que trabalham com este material têm sido fortemente influenciados por diversos fatores, nomeadamente a qualidade do ensino especializado nesta área, e o empenhamento de instrutores, técnicos e professores. Para consolidar esta afirmação, realizamos várias entrevistas a artistas destes três países.

Algumas características do vidro tornam-no vulnerável a atos de vandalismo. Esta situação coloca sérios desafios aos artistas que pretendam criar obras de arte em vidro em espaços públicos. Assim sendo, estudámos várias abordagens possíveis para solucionar este problema, desde a aplicação de técnicas específicas a programas educativos direcionados e leis antivandalismo, que podem efetivamente reduzi-lo, apresentando casos de estudo bem e mal-sucedidos da arte do vidro em espaço público.

Finalmente, apresentamos uma proposta de projeto de arte pública em vidro, denominada Discovery Sails, que pretende celebrar as Descobertas Portuguesas, quando Portugal e os seus marinheiros exploravam o mundo com as suas caravelas. Propomos inovar utilizando pedras e fritas vítreas luminescentes, como materiais ecológicos que absorvem a energia do sol e cintilam no escuro. Este projeto destina-se a ser executado e instalado nas imediações do Museu do Vidro da Marinha Grande.

A nossa pesquisa provou que o vidro, além das suas características funcionais, pode perfeitamente ser usado na criação de projetos públicos inovadores, tendo por base sólida fundamentação conceptual. Nesse sentido, tanto o apoio financeiro e a capacidade económica dos países, assim como o seu contexto artístico, podem melhorar e influenciar o avanço da arte pública em vidro.

**Palavras-chave:** Arte Pública, Arte em Vidro, Arte Pública em Vidro, Ensino Artístico do Vidro, Vandalismo

# Contents

Acknowledgment .....	iv
Abstract.....	vi
Resumo .....	viii
Contents.....	x
List of Figures .....	xiv
Introduction .....	1
Motivation .....	4
Research objectives.....	8
Research methodology.....	10
The Thesis Structure .....	12
Chapter 1: Public Art .....	15
1.1    A Brief History of Public Art .....	15
1.2    Space, Place, and Public Space .....	19
1.3    Public Art: The General Definition.....	24
1.4    Public Art in The Contemporary Urban Context .....	30
1.5    Audience and Place in Public Art.....	31
1.6    Challenges to Public Art .....	34
1.6.1    Cultural scopes .....	35
1.6.2    Social Scopes .....	36
1.6.3    Political Scopes.....	39
1.6.4    Economic Scopes .....	46
Chapter 2: Glass Art in Public Spaces .....	50
2.1    Divisions of Glass Art in Public Spaces in The Contemporary Urban Context.....	50
2.1.1    Architectural Glass Art.....	53
2.1.2    Sculptural Glass Art and Glass Art Installation .....	58
2.1.3    Public Glass Art.....	61
2.2    The Capacity of Glass as a Versatile Material .....	64
2.3    Techniques that Have Been Used in Contemporary Public Glass Art .....	70
2.3.1    Stained Glass .....	70

2.3.2	Tiffany .....	74
2.3.3	Dalle de Verre.....	77
2.3.4	Film on Glass .....	78
2.3.5	Lamination, Tempered/Toughened Glass Techniques .....	80
2.3.6	Screen Printing .....	82
2.3.7	Digital Printing.....	85
2.3.8	Painting on Glass .....	88
2.3.9	Layered Glass .....	90
2.3.10	Blowing.....	94
2.3.11	Lampworking .....	96
2.3.12	Etched Glass and Sandblasting.....	98
2.3.13	Kiln Forming.....	100
2.3.14	Kiln Casting .....	104
2.4	Evolution of Modern Technology on Public Glass Art .....	108
2.4.1	Dichroic Glass .....	110
2.4.2	The Recently Invented Glass Technologies .....	113
<b>Chapter 3: The History and The Current State of Glass Art in Portugal, Iran, and Great Britain .....</b>		<b>121</b>
3.1	Three Perspectives: Portugal, Iran, and Great Britain.....	121
3.2	A Brief History of Glass Art and Public Glass Art in Portugal.....	122
3.3	The Current State of Glass Art and Public Glass Art in Portugal.....	127
3.3.1	Joana Vasconcelos .....	132
3.3.2	José Pedro Croft .....	140
3.3.3	Conceição Cabral .....	143
3.4	A Brief History of Glass Art and Public Glass Art in Iran.....	146
3.5	The Current State of Glass Art and Public Glass Art in Iran .....	151
3.6	A Brief History of Glass Art and Public Glass Art in Great Britain.....	156
3.7	The Current State of Glass Art and Public Glass Art in Great Britain .....	159
3.7.1	Andrew Moor Association .....	164
3.7.2	Kirsty Brooks .....	166
3.7.3	Danny Lane.....	168
3.7.4	Graham Jones.....	171
3.7.5	Brian Clarke .....	172



3.7.6	David Pearl and Amber Hiscott.....	176
3.7.7	Cate Watkinson .....	178
<b>Chapter 4: Debates on The Improvement of Public Glass Art in Urban Contexts .....</b>		<b>181</b>
4.1	Public Glass Art Obstacles and How to Overcome Them .....	181
4.2	Vandalism .....	184
4.2.1	Techniques to Prevent Vandalism in Public Glass Art .....	187
4.2.2	Successful Case Studies of Glass Art in Public Spaces.....	192
4.2.3	Vandalized Case Studies of Glass Art in Public Spaces .....	200
4.3	The Role of Education on The Improvement of Public Glass Art .....	204
4.3.1	Glass Education in Portugal .....	208
4.3.2	Glass Education in Iran .....	215
4.3.3	Glass Education in Great Britain .....	219
4.4	Discussion on The Improvement of Glass Art in Public Spaces in Portugal, Iran, and Great Britain 226	
<b>Chapter 5: Public Glass Art Project .....</b>		<b>230</b>
5.1	Introduction.....	230
5.2	Overview of <i>Discovery Sails</i> Project (Presentation of the Fundamental Concepts and Ideas of the Project) .....	230
5.3	Objectives of The <i>Discovery Sails</i> Project .....	234
5.4	Important Elements to Contextualize the Project .....	235
5.4.1	Work Location .....	235
5.4.2	Characterization of Social Targets and Publics Which May Benefit From Its Construction	239
5.4.3	Consideration of Social Criticisms That Could Be Made Regarding This Public Glass Art ...	243
5.5	Preparation Phases Before the Project Execution .....	244
5.5.1	Ideation and Brainstorm Sketches.....	244
5.5.2	Design and Digital Simulation .....	251
5.5.3	Technical Possibilities .....	260
5.6	Approaches to Prevent Vandalism in The <i>Discovery Sails</i> Project.....	274
5.7	Final Remarks .....	274

<b>Chapter 6: Conclusion.....</b>	<b>276</b>
6.1 <b>Thesis Summary .....</b>	<b>276</b>
6.2 <b>Concluding Remarks on Public Glass Art in Great Britain, Portugal, and Iran .....</b>	<b>278</b>
6.3 <b>Reflections on The Improvement of Public Glass Art.....</b>	<b>280</b>
6.4 <b>Direction for Future Work .....</b>	<b>282</b>
<b>Bibliography .....</b>	<b>285</b>
<b>Appendix 1: The Required Budget and Expected Support for the Discovery Sails Project .....</b>	<b>307</b>
<b>Appendix 2: Terms of Execution and Delivery of the Discovery Sails Project .....</b>	<b>310</b>
<b>Appendix 3. Interviews.....</b>	<b>311</b>
<b>Interview with Joost Van Santen .....</b>	<b>311</b>
<b>Interview with Alexandra Abreu .....</b>	<b>314</b>
<b>Interview with Fernando Carradas.....</b>	<b>315</b>
<b>Interview with Dr. José Frade .....</b>	<b>316</b>
<b>Interview with Joana Vasconcelos .....</b>	<b>317</b>
<b>Interview with Daniela Pinheiro .....</b>	<b>318</b>
<b>Interview with João Silva .....</b>	<b>322</b>
<b>Interview with Joana Silva .....</b>	<b>325</b>
<b>Interview with Dr. Teresa Almeida.....</b>	<b>330</b>
<b>Interview with Dr. Fernando Quintas.....</b>	<b>331</b>
<b>Interview with Conceição Cabral.....</b>	<b>332</b>
<b>Interview with Andrew Moor .....</b>	<b>333</b>
<b>Interview with Louis Thompson.....</b>	<b>335</b>
<b>Interview with Dr. Vanessa Cutler.....</b>	<b>336</b>
<b>Interview with Dr. Cate Watkinson .....</b>	<b>342</b>
<b>Interview with Dr. Jeffrey Sarmiento .....</b>	<b>343</b>
<b>Interview with Dr. Jessamy Kelly .....</b>	<b>344</b>
<b>Interview with Dr. Arezoo Khanpour .....</b>	<b>345</b>
<b>Interview with Hayas Hosseini.....</b>	<b>346</b>
<b>Interview with Saeed Golkar .....</b>	<b>347</b>
<b>Appendix 4. Recorded interviews .....</b>	<b>348</b>

# List of Figures

Figure 1-1. *Triumph of Shapur I*. c. 241–272. Naghsh-e Rostam, Fars Province, Iran. © Diego Delso, License CC-BY-SA ..... 17

Figure 1-2. This image shows the difference between semi-public and semi-private spaces. © (Torisson, 2010). ..... 23

Figure 1-3. *Martyrs of the Bahrami brothers*. Mural. Tehran, Iran. 242 square meters. .... 26

Figure 1-4. *Baharestan*. Manely Manouchehri. 2016. Tehran, Iran. .... 26

Figure 1-5. *It is always raining in Seyed Khandan*. Farzaneh Abdoli. 2016. Tehran, Iran. .... 26

Figure 1-6. *Paper windmill*. Javed Asadzadeh. 2016. Tehran, Iran. .... 26

Figure 1-7. Titled Arc. Richard Serra. Manhattan, New York, USA. 1981. ©Photo: Anne Chauvet. .... 28

Figure 1-8. Removal of Titled Arc. Richard Serra. Manhattan, New York, USA. 15 March 1989. ©Photo: Jennifer Kotter. .... 28

Figure 1-9. *ArcelorMittal Orbit*. Anish Kapoor and Cecil Balmond. London, UK. 2012. ©ArcelorMittal Orbit. .... 29

Figure 1-10. *TEDx Aveiro*. Vhils. Aveiro, Portugal. 2012. Photo: Smart B. ©www.vhils.com. .... 31

Figure 1-11. *Programe d’art mural*. Vhils. Ville de Montréal, Canada. 2017. ©www.vhils.com. .... 31

Figure 1-12. *A Light Touch*. Canberra center. Australia. 2016. Left image ©MGriffiths, 23 April 2016. (Griffiths, 2016, p. 33). Right image ©Paul Jurak. .... 33

Figure 1-13. *Maman*. Louise Bourgeois. Guggenheim Bilbao Museum. 1999. 927 x 891 x 1023 cm. © FMGB Guggenheim Bilbao Museoa, 2019. .... 34

Figure 1-14. *Cloud Gate*. Anish Kapoor. Millennium Park, Chicago, USA. 2006. ©Anish Kapoor.com ..... 37

Figure 1-15. *D. Afonso Henriques*. João Cutiliero. Guimarães, Portugal. 2001. .... 40

Figure 1-16. *General Humberto Delgado*. José Rodrigues. Porto, Portugal. 2008. .... 40

Figure 1-17. *Non-Violence (The Knotted Gun)*. Carl Fredrik Reuterswärd. United Nations headquarters in New York, USA. Completion date 1985. © dailyphotostream.blogspot.com. .... 42

Figure 1-18. *The Freedom Sculpture or Freedom*. Zenos Frudakis in downtown Philadelphia, Pennsylvania, USA. 2001. © 2015-2020. FRUDAKIS STUDIO. .... 42

Figure 1-19. *Reza Shah Boots*. Unknown artist. Sa’dabad palace Complex in Tehran, Iran. (n.d.) ©Abbas Attar. .... 43

Figure 1-20. The image of Stalin was on the banner in the opening day of the station in 1950, but it was replaced with the image of Yuri Gagarin in 1961 (Guzeva, 2019). .... 44

Figure 1-21. *Ola Enstad*. Fist and Rose (Neve Og Rose). Lillestrøm, Oslo, Norway. 1990. .... 45

Figure 1-22. *Going Away, Coming Home*. Hung Liu. Oakland International Airport, Terminal 2 Window Project, 10’ x 160’, Oakland, California, USA. 2006. ©Hung Liu 2016. .... 47

Figure 1-23. Guggenheim Museum (museum of modern and contemporary art). Frank Gehry (architect). Bilbao, Spain. Inaugurated on 18 October 1997. ©Denis Doyle for The New York Times. ....	49
Figure 2-1. This figure represents the division of glass art in public spaces. ....	51
Figure 2-2. <i>Reichstag</i> , Parliament of Berlin, Germany. Rebuild between 1992 and 1999. ....	52
Figure 2-3. Inside the Reichstag dome. Designed by Norman Foster. Parliament of Berlin, Germany. ©Foster + Partners. ....	52
Figure 2-4. <i>German Flag</i> . Gerhard Richter. Reichstag, Parliament of Berlin, Germany. 1998© (Foster, 2000, p 219). ....	54
Figure 2-5. Lexington Street Spitfires. Brian Clarke. View from inside of the Soho PACE Gallery. Soho, London, UK. 2016. ©Parinaz Faghihi-2017 .....	56
Figure 2-6. Street view of Lexington Street Spitfires. Brian Clarke. Soho, London, UK. 2016. ©Brian Clarke.....	56
Figure 2-7. <i>Pyramid in Peace</i> . Brian Clarke. Astana, Kazakhstan. 2005. ©2013-2020 Brian Clarke. ....	57
Figure 2-8. Inside the <i>Pyramid in Peace</i> . Brian Clarke. Astana, Kazakhstan. 2005. ©2013-2020 Brian Clarke. ...	57
Figure 2-9. <i>Leica Museum</i> . Alt Alfons. Wetzlar, Germany. 2013? ©LambertsGlass.....	57
Figure 2-10. Ethereal White Persian Pond (detail), 2018. Dale Chihuly. Royal Botanic Gardens, Kew, London, installed in 2019. ©2019 Chihuly, Inc. ....	59
Figure 2-11. Foat Boat, 2008, The Sun, 2003, and Red Reeds, 2009. Dale Chihuly. Salk Institute for Biological Studies, La Jolla, California, installed in 2010. ©2019 Chihuly, Inc.....	59
Figure 2-12. <i>Peephole (for J. K.)</i> . Jan Ambrůz. Granary (1994). Dimensions: 180×180×1400cm ©Photographer: Daniel Šperl. Agosto Foundation.....	59
Figure 2-13. <i>Angles of Incidence</i> . Warren Langley and Julia Davis. Sydney, Australia. 2016. © Photo credit: Richard Glover.....	60
Figure 2-14. <i>Vision of Color</i> . Mark Dziewulski and Shan Shan Sheng. Oklahoma, USA. 2008. 10 x 20 x 8 ft ©Shan Shan Sheng.....	61
Figure 2-15. <i>Crown Fountain</i> . Jaume Plensa. Millennium Park, Chicago, USA. 2004. Made of glass bricks. © Copyright 2020 Jaume Plensa. ....	62
Figure 2-16 <i>Ascent at Tower Square</i> . Jun Kaneko. Lincoln, Nebraska. 2014. ©Jun Kaneko. ....	62
Figure 2-17. Entrance of the Gebouw Delftse Poort administrative Nationale-Nederlanden building. Václav Cigler. Rotterdam, Netherland. 1992. ....	68
Figure 2-18. <i>Ellipse of Light</i> . Joost Van Santen. Amersfoort, Netherlands. 2001. ©Joost Van Santen. ....	69
Figure 2-19. <i>Light Man Number 1</i> . Joost Van Santen. Wenceslas Square Prague Czech Republic. 2004. ©Joost Van Santen. ....	69
Figure 2-20. <i>Dome of Light</i> . Narcissus Quagliata in collaboration with Derix studio. central metro station of Kaohsiung. Taiwan. 2008. ©Narcissus Quagliata.....	72
Figure 2-21. <i>House Stark</i> . The 1st stained glass window. On the grounds of Belfast City Hall, Ireland. ©publicis.co.uk. ....	73

Figure 2-22. <i>House Targaryen</i> . The 4th stained glass window. Belfast, Northern Ireland. 2019 ©BelfastGiants. .....	73
Figure 2-23. The 6th stained glass window. Belfast, Northern Ireland. ©IrishCentral.....	73
Figure 2-24. <i>White walkers</i> - The 5th stained glass window. beside SS Nomadic at Hamilton Dock. ©downtownradi. ....	73
Figure 2-25. <i>(Any) Body Oddly Propped</i> . Doug and Mike Starn. The Princeton University Art Museum, New Jersey, USA. 2015. ....	74
Figure 2-26. <i>The Manchester Lamps</i> . studio Acrylicize. Manchester. England. 2018. ©Acrylicize 2019. ....	76
Figure 2-27. <i>The Manchester Lamps</i> . studio Acrylicize. Manchester. England. 2018. ©Acrylicize 2019. ....	76
Figure 2-28. New York Hall of Science. Queens, New York. built-in 1965. © 2019 Rethinking Internet Media Pvt Ltd. ....	77
Figure 2-29. Cobalt Dalle de Verre panels. © Jeff Goldberg/Esto. ....	77
Figure 2-30. <i>Time and tide</i> . Declan O’Carroll and Arup Associates. Plantation Place, London, 2005. 41×6m. ....	78
Figure 2-31. The left image shows Time and tide at daylight. ©Parinaz Faghihi. ....	78
Figure 2-32. <i>Desert Purple</i> . Susan Kaprov. Las Vegas Bus Stations, USA. 2014. Dimensions: 5 ft high x 20 feet wide. ©Susan Kaprov 2019. ....	79
Figure 2-33. <i>Spring Mountains</i> . Susan Kaprov. Las Vegas Bus Stations, USA. 2014. Dimensions: 5 ft high x 20 feet wide. ©Susan Kaprov 2019. ....	79
Figure 2-34. <i>Reason to Be</i> . Jessica Jackson Hutchins. Portland, Oregon, United States. 2017. © Jessica Jackson Hutchins. Photo by Joseph Freeman.....	80
Figure 2-35. <i>Helping hands</i> . Cate Watkinson in collaboration with Colin Rennie. Hospital in Cramlington, England. 2015. ©www.watkinsonglass.com.....	81
Figure 2-36. Screen Printing Equipment. © 2019 Custom Planet Ltd. ....	83
Figure 2-37. Jeffrey Sarmiento Screen printing enamels onto a long sheet of glass. ©Jeffrey Sarmiento .....	84
Figure 2-38. Squeegees color through large screens – Project for Portnoy Residence in Hillsborough, USA, Design by the cooperation of artists Janssen and Wood. ©2019 Derix Glasstudios. ....	84
Figure 2-39. <i>Confluence</i> . Jeffrey Sarmiento. Durham, UK. 2018. ©Kevin Petrie. (Petrie, 2019, p8). ....	84
Figure 2-40. The digital glass printing process.....	85
Figure 2-41. <i>Anzac Memorial</i> . Charlie and Joan Smith. Ocean Beach RSL, Perth, Australia. 2015. Digital print on 13.52mm toughened laminated glass. © 2015 Dip-Tech Digital Printing Technologies Ltd.....	86
Figure 2-42. <i>International Airport in Hong Kong</i> . Arrival hall. Graham Jones. 2016. 202m2. ©Andrew Moor Associates.....	87
Figure 2-43. <i>International Airport in Hong Kong</i> . Departure hall. Graham Jones. 2016. 305m2. ©Andrew Moor Associates.....	87
Figure 2-44. <i>Metamorphosis</i> . Martin Donlin. Terminal 1 Ticketing Lobby and Security Checkpoint Raleigh Durham Airport, North Caroline, USA. ©Martin Donlin 2014. ....	88

Figure 2-45. <i>Going Away, Coming Home</i> . Hung Liu. Oakland International Airport, Terminal 2 Window Project, 10' x 160', Oakland, California, USA. 2006. ©Hung Liu 2016.....	89
Figure 2-46. 3D image of <i>In Nature</i> . Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019.....	91
Figure 2-47. Prototype of <i>I Nature</i> . Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019.....	91
Figure 2-48. Cutting and hand treatment. <i>In Nature</i> . Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019. ....	91
Figure 2-49. Blocks of layered glass are ready for shipping. <i>In Nature</i> , Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019.....	91
Figure 2-50. Final installation. <i>In Nature</i> . Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019.....	92
Figure 2-51. Lightening the project. <i>In Nature</i> . Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019.....	92
Figure 2-52. <i>The Runner</i> . Costas Varotsos. 1988-1994. Athens, Greece. © 2019 Colossal. ....	93
Figure 2-53. <i>L' Approdo</i> . Costas Varotsos. 2012. Otranto, Italy. © Costas Varotsos. Photo by M.Stallop. ....	93
Figure 2-54. Images of the project <i>The Light of Jerusalem</i> . Dale Chihuly. Jerusalem, Israel. 2000. ©Chihuly, Inc. ....	95
Figure 2-55. <i>Play the glass</i> . Masuda Hiromi. Church of St Francesco, Venice, Italy. 2003. ©Masuda Hiromi. ....	96
Figure 2-56. Tools for lampworking. ©Parinaz Faghihi .....	97
Figure 2-57. <i>Red biosphere</i> . Mauro Bonaventura. Venice, Italy. 2004. © Mauro Bonaventura. ....	97
Figure 2-58. <i>Badener Forest</i> . Susan Liebold. Germany 2011. ©Susan Liebold.....	97
Figure 2-59. <i>Little Gidding</i> . Lime Street Railway Station, Liverpool, UK. 1984. © Clifford Rainey. ....	98
Figure 2-60. <i>Spektrum</i> . Raphael Seitz. Stuttgart, Germany. 2014. © Derix Glasstudios. ....	99
Figure 2-61. <i>Spektrum</i> . Raphael Seitz. Stuttgart, Germany. 2014. ©photo: Jens Weber•.....	99
Figure 2-62. Tack fusing. ....	100
Figure 2-63. Full fusing.....	100
Figure 2-64. <i>Telling our story</i> . Washington Glass Studio. Peppermill Community Center. Washington, USA. 2019. ©Washington Glass Studio. ....	101
Figure 2-65. Details of <i>Telling our story</i> . Washington, USA. 2019. ©Washington Glass Studio.....	101
Figure 2-66. Institute for Sound and Vision. Hilversum, Netherlands. 2006.©Jaap Drupsteen.....	103
Figure 2-67. The glass panels details of the Institute for Sound and Vision. Hilversum, Netherlands. 2006. ©Jaap Drupsteen. ....	103
Figure 2-68. printing the enamels on glass panels of the Institute for Sound and Vision. Hilversum, Netherlands. 2006. ©Jaap Drupsteen. ....	103

Figure 2-69. The glass panels details of the Institute for Sound and Vision. Hilversum, Netherlands. 2006. ©Jaap Drupsteen. ....	103
Figure 2-70. <i>Patchwork Man</i> . Max Jacquard. (n.d). ©Photographer: Simon Kendrick. ....	104
Figure 2-71. <i>Celtic Cross</i> . Colin Reid. St John's Church, Copthorne, Sussex, UK. 2006. Height: 150cm. ©David Mocatta. ....	105
Figure 2-72. <i>Australian Nurses War Memorial</i> . Designed by Robin Moorhouse. Canberra, Australia. 1999. ©Axolotl Group Pty Ltd 2019. ....	106
Figure 2-73. Top view of <i>Australian Nurses War Memorial</i> . Canberra, Australia. 1999. ©Axolotl Group Pty Ltd 2019. ....	106
Figure 2-74. <i>Poise</i> . Warren Langley. Melbourne, Australia. 2006. Dimensions: 6m high x 5m diameter. ©Warren Langley 2020. ....	106
Figure 2-75. <i>Boat</i> . Bertil Vallien. 4×19.5×2.75 inches. 2018. ©Schantz Galleries. ....	107
Figure 2-76. Public art for Linderman school of Kalispell. Lee Proctor. Montana, USA. 2014. ©proctorstudios. .....	108
Figure 2-77. Sand-casting details. Lee Proctor. Montana, USA. 2014. ©proctorstudios. ....	108
Figure 2-78. <i>Prismatica</i> (in daylight and nightlight), RAW design, downtown Montreal, Canada, 2015. ©Photography by James Brittain. ....	111
Figure 2-79. <i>Vessel</i> . Ed Carpenter. Fred Hutchinson Cancer Research Center, Seattle, Washington, United States. 2008. Dimensions: 39' diameter wide x 60' high. Aluminum, stainless steel, laminated dichroic glass, beveled clear plate glass, concrete, and landscape vegetation. ©2002-2019 Ed Carpenter. ....	112
Figure 2-80. <i>Mesaflora</i> . Ed Carpenter. Phoenix AZ Metro Light Rail. United States. 2015. Dimensions: 30' x 10' x 24'. Laminated glass, stainless steel, painted mild steel. ©2002-2019 Ed Carpenter. ....	112
Figure 2-81. <i>Crocus</i> . Ed Carpenter. City of Taichung, Taiwan. 2016. Dimensions: 72' high x 20' wide. Stainless steel and laminated glass. ©2002-2019 Ed Carpenter. ....	112
Figure 2-82. <i>Subtle movements of the corals in the Blue ocean II</i> (under daylight and ultraviolet light), Teresa Almeida. 2008. ©Teresa Almeida. ....	114
Figure 2-83. Glass 3D printing process. ©Photo: Steven Keating (left), and Caustic patterns of a 3D printed glass structure. Photo: Chikara Inamura (right). ....	115
Figure 2-84. <i>Tower Zero, No.1</i> of The Satellite series. Robert Knottenbelt. CAD/CAM- designed glass, water-jet cut, sandblasted, acid-polished, silicon glues, 61×42×1.2 cm1991. Photo: Terence Bogue. ....	117
Figure 2-85. <i>Liverpool Map</i> . Inge Panneels and Jeffrey Sarmiento. 2011. Museum of Liverpool, UK. ....	118
Figure 2-86. A crystalline silicon solar cell. ....	119
Figure 2-87. <i>Lux Nova</i> . Sarah Hall. 2007. Wind tower Regent College, Vancouver, Canada. ©Stained Glass Peters GmbH. ....	120
Figure 2-88. <i>Lux Nova</i> . Sarah Hall. 2007. Details of the cross and Aramaic script. Wind tower Regent College, Vancouver, Canada. ©Sarah Hall Studio. ....	120
Figure 3-1. <i>Bee's / Project</i> . Susana Soares. 2007-2009. © 2011 Susana Soares. ....	124

Figure 3-2. The stained glass window of the Nossa Senhora de Fátima Church, Lisbon. Almada Negreiros. 1934-38. The three stained glass windows are installed on the main façade. ©Teresa Almeida. ....	125
Figure 3-3. Stained Glass windows of Igreja da Sagrada Família. Francisco Laranjo. Chaves, Portugal. 2008. © Francisco Laranjo. ....	126
Figure 3-4. Outside of Glass Museum of Marinha Grande. Portugal. © <a href="https://www.cm-mgrande.pt">https://www.cm-mgrande.pt</a> .....	128
Figure 3-5. Inside of Glass Museum of Marinha Grande. Portugal. Permanent exhibition. © <a href="https://www.cm-mgrande.pt">https://www.cm-mgrande.pt</a> .....	128
Figure 3-6. Outside of Glass Museum of Marinha Grande for contemporary exhibitions. Portugal. ©atelier XYZ. ....	129
Figure 3-7. Inside of Glass Museum of Marinha Grande. Portugal. Temporary exhibition. This image shows the Glass seen through feminine eyes exhibition in Marinha Grande Glass Museum from October 19, 2013 until April 2014. ©Teresa Almeida.....	129
Figure 3-8. Worst case scenario: under the water. Barbara Walraven. Cencal building, Marinha Grande, Portugal. ©Teresa Almeida.....	131
Figure 3-9. Teresa Almeida. Cencal building, Marinha Grande, Portugal. ©Teresa Almeida. ....	131
Figure 3-10. <i>Murjonas</i> . Klaus U. Hilsbecher. Back entrance of Glass Museum of Marinha grande, Portugal. Installed in 2017. ©Teresa Almeida.....	131
Figure 3-11. <i>Escape y Quietud</i> . Plabo Pizarro. Glass Museum of Marinha grande, Portugal. 2011. 255x70x30 cm. ©Teresa Almeida. ....	131
Figure 3-12. Picture A. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	133
Figure 3-13. Picture B. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	133
Figure 3-14. Picture C. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	133
Figure 3-15. Picture D. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	133
Figure 3-16. Coeur de paris piece in process. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	133
Figure 3-17. Picture E. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.....	133
Figure 3-18. Maquette Of I'll Be Your Mirror. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	133
Figure 3-19. Maquette of Solitaire. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	133
Figure 3-20. Maquette of Gateway (A). Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	134
Figure 3-21. Maquette of Gateway (B). Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	134
Figure 3-22. Picture F. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.....	134
Figure 3-23. Picture G. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	134
Figure 3-24. Picture H. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	134
Figure 3-25. Picture I. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.....	134
Figure 3-26. Picture J. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi. ....	135
Figure 3-27. Picture K. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.....	135



Figure 3-28. Picture L. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi .....	135
Figure 3-29. Picture M. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi .....	135
Figure 3-30. <i>Nectar</i> . Joana Vasconcelos. Berardo Collection Museum, Lisbon, Portugal. 2006. 720 x Ø 350 cm ©Joana Vasconcelos. ....	136
Figure 3-31. <i>Message in a Bottle</i> . Joana Vasconcelos. Echigo-Tsumari Art Triennial, several locations, Tokamachi, Japan. 2006. (2x) 650 x Ø 350 cm. ©Joana Vasconcelos. ....	136
Figure 3-32. <i>Blue Champagne</i> . Joana Vasconcelos. Château de Versailles, Versailles, France. 2012. (2x) 940 x Ø 496 cm. ©Joana Vasconcelos.....	137
Figure 3-33. <i>I'll Be Your Mirror #1</i> . Joana Vasconcelos. San Clemente Palace Kempinski, Isola di San Clemente, Venice. Bronze, mirrors. 356 x 682 x 537 cm, Berardo collection. 2019. ©Joana Vasconcelos. ....	138
Figure 3-34. Details of <i>I'll Be Your Mirror #1</i> . ©Joana Vasconcelos.....	138
Figure 3-35. <i>Solitaire</i> . Joana Vasconcelos. Collection of the artist. 2018. 720 x 604 x 209 cm. ©Joana Vasconcelos.....	138
Figure 3-36. <i>Rosalinda</i> . Joana Vasconcelos. Rafael Bordalo Pinheiro faience painted with ceramic glaze, Azores crocheted lace. (Galería Horrach Moyà), Cordoaria Nacional, Lisbon. 2019. 25 x 55 x 125 cm. ©Joana Vasconcelos.....	139
Figure 3-37. <i>Untitled</i> . José Pedro Croft. Collection Banco Sabadell. Barcelona, Spain 2015. 700 × 500 × 20 cm (× 3). ©Sabadell. ....	141
Figure 3-38. <i>Uncertain Measure</i> . José Pedro Croft. Casa da Arquitectura, Matosinhos, Portugal. 2017. ©Francisco Teixeira. ....	142
Figure 3-39. <i>Uncertain Measure</i> . José Pedro Croft. Casa da Arquitectura, Matosinhos, Portugal. 2017. ©Rui Duarte Silva. ....	142
Figure 3-40. Conceição Cabral in her studio in Valade dos Frades, Portugal. This photo was taken on 25.2.2020. ©Teresa Almeida. ....	144
Figure 3-41. Glass panel in Hotel Santa Maria in Fatima, Portugal. Executed by Conceição Cabral. ....	145
Figure 3-42. Conceição Cabral in her studio with pieces of Berardo garden project. This photo was taken on 25.2.2020. ©Teresa Almeida. ....	145
Figure 3-43. Glass objects used at the walls and doors of the Tchogha Zanbil Ziggurat. 2.500 BC. Khuzestan province in southwest Iran ©Mohammadamin Emami. ....	147
Figure 3-44. <i>Tchogha Zanbil Ziggurat</i> . Khuzestan province in southwest Iran ©OUR PLACE The World Heritage Collection. ....	147
Figure 3-45. Sassanian glass bowls, Azarbaijan Museum, Tabriz, Iran. ©Alborz Fallah. ....	147
Figure 3-46. Sassanian Glass. Bowl, thick, colorless glass, facet-cut, Iran or Iraq; 6th-7th century, H: 8.3; Diam: 11.5 cm. The David collection ©www.davidmus.dk. ....	147
Figure 3-47. Colorless glass blowing. 10th century. ©(Carboni, & Sabah, 2001, p 88). ....	147
Figure 3-48. Colorless glass blowing. mid-10th century. ©(Carboni, & Sabah, 2001,p 86).....	147
Figure 3-49. Haj Agha Ali's house in Rafsanjan, Kerman, Iran. Gajar Era. © Sara Lava. ....	149

Figure 3-50. Dolatabad Garden, Yazd, Iran. Built in 1747. © Mahdi Taheri. ....	149
Figure 3-51. Nasir Al Mulk Mosque, Shiraz, Iran. Built-in Qajar era. © Mohammad Nouri. ....	150
Figure 3-52. Aminiha Hosseiniyeh, Qazvin, Iran. Built in 1858. © Marziye Falahnejad. ....	150
Figure 3-53. Alvan Bolour factory. Traditional glassblowing factory in the suburb of Tehran, Iran. Captured in 24.11.2020. ©Arezoo Khanpour. ....	152
Figure 3-54. Inside and outside of Dome of Jaberi Mosque. Kajeh decoration company. Bandar Abbas, Iran. 2017. Dimensions: Diameter: 1.2 m, Height: 1.2 m ©Kajeh.com. ....	153
Figure 3-55. Images of glass domes and ceilings executed by Afshin Hajhasan. Iran. ©Afshin Hajhasan. ....	153
Figure 3-56. <i>Wave</i> . Rohollah Yousefipour. Shilat Square, Babolsar, Iran. 2018. ©Shishebaran. ....	154
Figure 3-57. Monir Shahroudy Farmanfarmaian in her studio in Tehran, Iran. 2015. ©James Whineray. ....	155
Figure 3-58. British Museum. Collection of Roman glasses from the 1st and 2nd AD century. ©Parinaz Faghihi, July 2017. ....	156
Figure 3-59. Detail of Tree of Jesses. York Minster, England. 1170. (Horsfield, 2015, p 34). ....	158
Figure 3-60. Stained glass windows of Canterbury Cathedral. Kent, UK. 13th Century. (Horsfield, 2015, p 2). ....	158
Figure 3-61. <i>Glass Fountain</i> . Allen David. Guildhall Piazza, London. 1969. ....	159
Figure 3-62. Details of <i>Glass Fountain</i> . Allen David. Guildhall Piazza, London. 1969. ....	159
Figure 3-63. <i>The Magician</i> . Allen David. Einstein Street median at Levi Eshkol, Tel Aviv, Israel. 1989. ....	160
Figure 3-64. These are photos of buildings in London that are covered and designed by the glass. The UK. ©Parinaz Faghihi, July 2017. ....	160
Figure 3-65. <i>Exeter Traceries</i> . Katayoun Pasban Dowlatshahi. 2006. Princesshay, Exeter, UK. © Katayoun Pasban Dowlatshahi. ....	161
Figure 3-66. <i>Pebble seats</i> . Jeff Bell. Princesshay, Exeter, UK. 2009? © Ian James Cox. ....	161
Figure 3-67. Louis Thompson in Peter Layton London Glassblowing studio glass gallery. Captured on 28 July 2017. ©Parinaz Faghihi. ....	163
Figure 3-68. <i>Devotion 2016</i> . Louis Thompson. Salisbury Cathedral, Salisbury, England. 2016. Height: 245cm. ©Ash Mills. Retrieved from <a href="https://www.louisthompson.com/salisbury-cathedral">https://www.louisthompson.com/salisbury-cathedral</a> . Access date 2.11.2020. ....	163
Figure 3-69. <i>Bridlington Spa</i> . Andrew Moor- Bridlington, UK. 2010. night light ©Andrew Moor.....	165
Figure 3-70. <i>Bridlington Spa</i> . Andrew Moor. Bridlington, UK. 2010. Daylight ©Andrew Moor .....	165
Figure 3-71. Villa Astana. Andrew Moor association. Designed by Martin Donlin. Astana, Kazakhstan. 2017. Dimensions: 7.5m wide X 2.4m high. © Andrew Moor. ....	166
Figure 3-72. <i>Kirkstall Bridge Clock Tower</i> . Night light. Kirsty Brooks. Kirkstall, Leeds, UK. 2015. Dimensions: 120cm x 400cm x 50cm. ©2020 Axisweb. ....	167
Figure 3-73. <i>Kirkstall Bridge Clock Tower</i> . Daylight. Kirsty Brooks. Kirkstall, Leeds, UK. 2015. © 2020 Axisweb. .....	167

Figure 3-74. Glasgow Fort retail park. Kirsty Brooks- Created in conjunction with Macgregor Smith Landscape Architects. Glasgow, Scotland. 2014-2016. Dimensions: 500cm x 120cm x 2.6cm typically. ©2020 Axisweb. Retrieved from <a href="https://www.axisweb.org/p/kirstybrooks/#artwork">https://www.axisweb.org/p/kirstybrooks/#artwork</a> .....	168
Figure 3-75. <i>Ellipsis Eclipses</i> . Danny Lane. Grainger Town, Newcastle upon Tyne. UK. 2005. ©Danny Lane. ...	170
Figure 3-76. <i>Opening line</i> . Danny Lane. Gateshead, UK. 2004. Dimensions: H450 xL9000 x D80 cm. ©Danny Lane.....	170
Figure 3-77. Detail design of the <i>Opening line</i> project. Danny Lane. Gateshead, UK. 2004. Dimensions: H450 xL9000 x D80 cm. ©Danny Lane. ....	170
Figure 3-78. <i>Lock Level Line</i> . Danny Lane. Paddington Basin, London, UK. 2003. Dimensions: H280 xL1300 x D33.5 cm. ©Danny Lane. ....	170
Figure 3-79. The window of Quincentenary Library. Graham Jones. Jesus College. University of Cambridge. 1999. © Iain Gutteridge. ....	171
Figure 3-80. <i>Victoria Leeds</i> . Brian Clarke. Leeds, England. 1990. 7,804 sq ft. ©2013-2020 Brian Clarke. ....	173
Figure 3-81. <i>Al Faisaliah Center</i> . Brian Clarke. Architect: Norman Foster. Riyadh, Saudi Arabia, 1999. 2,000sqm. ©The image is taken from Colours of architecture book page 102.....	174
Figure 3-82. <i>Stamford Cone</i> (Swiss Bank Cone). Brian Clarke. Stamford, CT, USA 1999. ©2013-2020 Brian Clarke. ....	174
Figure 3-83. Summer Solstice Screens. Images of screen panels of Brian Clarke’s exhibition in Heni Gallery in London, UK. 22nd June –30th July 2017. ©Parinaz Faghihi, July 2017.....	175
Figure 3-84. <i>Quatrefoil for Delius</i> . Amber Hiscott. Exchange Square, Bradford West Yorkshire, UK. 1993. ©David Pearl and Amber Hiscott.....	176
Figure 3-85. <i>Glass towers &amp; fountains</i> . David Pearl and Amber Hiscott (collaboration). Bute Square, Cardiff, Uk. 2000. © David Pearl and Amber Hiscott. ....	177
Figure 3-86. <i>Razor shells</i> . David Pearl and Amber Hiscott. Callaghan Square, Cardiff, UK. 2008. H. 4.1m, W 2.75m. © David Pearl and Amber Hiscott. ....	177
Figure 3-87. <i>LookOut</i> . Cate Watkinson. SW corner of the new development of the MetroCentre, Gateshead, UK. 2004. ©Cate Watkinson. ....	178
Figure 3-88. <i>LookOut at Night</i> . ©Cate Watkinson.....	178
Figure 3-89. <i>Baltic Butterfly</i> . Cate Watkinson and Vanessa Cutler. Baltic Business Quarter, Gateshead, UK. 2009. ©Cate Watkinson.....	179
Figure 3-90. <i>Tall Trees</i> . Cate Watkinson and Vanessa Cutler. Albert Road, Southsea, UK. 2016. ....	180
Figure 4-1. <i>O Mar</i> . Maria Keil. Av. Infante Santo, Lisbon, Portugal. 1958-59. ©Salt of Portugal. ....	182
Figure 4-2. <i>Pop Galo</i> . Joana Vasconcelos. Built-in 2016. Collection of the artist. Exhibited in 2020 Beyond, Yorkshire Sculpture Park, Wakefield; 2018 I'm Your Mirror, Guggenheim Museum Bilbao; 2017 Bauhaus Square, 798 Art District, Beijing; 2016, Avenida Ribeira das Naus, Lisbon. 900 x 372 x 682 cm ©Joana Vasconcelos.....	182
Figure 4-3. <i>Monumento ao Associativismo</i> . Virgínia Fróis. Alameda Guerra Junqueiro, Portugal. 1994. ....	182

Figure 4-4. <i>A Linha de Mar (The Line of the Sea)</i> . Pedro Cabrita Reis. Porto, Portugal. December 2019.....	190
Figure 4-5. <i>Crystal</i> . Edvin Öhrström. Vertical accent in glass and steel. Stockholm, Sweden. 1979. ....	192
Figure 4-6. <i>Blooming</i> . Shan Shan Sheng. Shenzhen, China. 2017. ©2020 CODAworx. ....	194
Figure 4-7. <i>Open Door</i> . Shan Shan Sheng. Lorain County Community College, Elyria, Ohio, United States. 2016. ©Shan Shan Sheng.....	195
Figure 4-8. <i>Open Wall</i> . Shan Shan Sheng. 53rd Venice Biennale 2009, Venice, Italy. 2009. ©Shan Shan Sheng. .....	195
Figure 4-9. <i>Ocean Wave I&amp;II</i> . Shan Shan Sheng. Port of Miami, Cruise Terminal D. Miami, Florida, United States, Cold casting translucent panels Suspension Sculpture, 38 x 210 x 40 ft. 2007. ©Shan Shan Sheng. ....	195
Figure 4-10. <i>Abacus {1046-771 BC}</i> . Shan Shan Sheng. Glassfever Exhibition, Dordrecht, Netherlands. 2016. Hand Made Venetian Glass, Stainless Steel, Wood. Dimensions 15 x 8 x 3 ft. ©Shan Shan Sheng. ....	195
Figure 4-11. Day and night in Chihuly's exhibition at Kew Garden. Dale Chihuly. Southwest London, England. 2005. ©Dale Chihuly. ....	197
Figure 4-12. <i>The V&amp;A Rotunda Chandelier</i> . Dale Chihuly. Victoria and Albert Museum, London. 2001. ©Andrew Dunn, 3 December 2004. ....	198
Figure 4-13. <i>The sun</i> . Dale Chihuly. Berkeley Square, London, England. 2014. ©Loco Steve. ....	198
Figure 4-14. <i>Blue Heart</i> . Marcel Smink. Delft Market Square, Netherland. 250×350×300 cm. 1998. ©Parinaz Faghihi. The photo was captured on 24.8.2019.....	199
Figure 4-15. The Steel framework inside of Blue Heart. Delft. ©Parinaz Faghihi. The photo was captured on 24.8.2019. ....	199
Figure 4-16. <i>Archangel Michael</i> . Herman Lamers. Zwolle, Netherlands. 2010. 3mtr. High. © Herman Lamers. .....	200
Figure 4-17. <i>Aden Tianjin China</i> . Herman Lamers. Tianjin, China. 2016. 3.5mtr. High. ©White Box Art Center. .....	200
Figure 4-18. <i>Untitled</i> . João Silva. At the lake of the Marinha Grande city park, Portugal. 2006. ©João Silva. ..	201
Figure 4-19. <i>Light Transformer</i> . Zora Palova. National Glass Center in Sunderland, England. 1998.....	202
Figure 4-20. <i>Monumento ao Autarca (Monument to the mayors of Fafe)</i> . Rogério Almeida. Fafe, Portugal. 2012. ©Parinaz Faghihi. ....	203
Figure 4-21. <i>Monumento ao Autarca (Monument to the mayors of Fafe)</i> . Rogério Almeida. Fafe, Portugal. 2012. ©Parinaz Faghihi. ....	203
Figure 4-22. Glass workshop of Escola Superior de Artes e Design de Caldas da Rainha, Portugal. Captured in 7.11.2017. ©Parinaz Faghihi. ....	210
Figure 4-23. Glass workshop of the Faculty of Fine Arts, University of Porto, Portugal. Captured in 19.11.2020. ©Teresa Almeida. ....	211
Figure 4-24. Photos of the 'kiln room' that are shared between glass and ceramics workshop. Faculty of Fine Arts, University of Porto, Portugal. Captured in 19.11.2020. ©Teresa Almeida. ....	211

Figure 4-25. Glass workshop of Faculty of Fine Arts of the University of Lisbon (FBAUL), Portugal. Captured in February 2021. ©Fernando Quintas. ....	213
Figure 4-26. Lampworking workshop in Cencal. Marinha Grande. Captured in 24.3.2018. ©Parinaz Faghihi. .	214
Figure 4-27. Glassblowing workshop in Tabriz Islamic Art University. Tabriz, Iran. Captured in 23.11.2020. ©Arezo Khanpour. ....	217
Figure 4-28. Glass workshop of the Art University of Tehran, Iran. Captured in 1.2.2016. ©Parinaz Faghihi. .	218
Figure 4-29. Facilities in the glass art department of Swansea College of Art. Swansea, England. ©2020 University of Wales Trinity Saint David. ....	223
Figure 4-30. Glass and Ceramic department of Sunderland University. ©University of Sunderland. ....	225
Figure 5-1. The illustration of the Portuguese Armada fleet in 1507. Taken from the book <i>Livro de Lisuarte de Abreu</i> . ©Captain DaCosta. ....	232
Figure 5-2. A Portuguese caravel. © Câmara Municipal de Sines. ....	232
Figure 5-3. Portuguese discoveries and explorations: first arrival places and dates; main Portuguese spice trade routes in the Indian Ocean (blue); territories claimed during King John III rule (c. 1536) (green) © <a href="https://www.livingmsia.com/lisbon-portugal-city-tolerance">https://www.livingmsia.com/lisbon-portugal-city-tolerance</a> . ....	233
Figure 5-4. This map shows the Leiria District in the middle of Portugal. ....	235
Figure 5-5. This map shows Marinha Grande among the other cities of the Leiria District. ©Regiao de Leiria.	235
Figure 5-6. These photos are taken from Marinha Grande Glass Museum and the surroundings. ©Parinaz Faghihi. May 10th, 2017. ©Parinaz Faghihi. ....	236
Figure 5-7. Site number 1 selected for the installation of public glass art on Google map. ....	237
Figure 5-8. Site number 1 selected for the installation of public glass art. ©Parinaz Faghihi. ....	238
Figure 5-9. Site number 2 selected for the installation of public glass art. ©Parinaz Faghihi. ....	238
Figure 5-10. Site number 2 selected for the installation of public glass art on bird's-eye view. This photo is a screenshot from the Google map. ....	238
Figure 5-11. A bird's-eye view of Marinha grande city center, Glass Museum, and surrounding buildings. The suggested places (site numbers 1 and 2) for the installation of public glass art are marked in red. ....	239
Figure 5-12. House of Afonso Lopes Vieira near São Pedro de Moel beach. ....	244
Figure 5-13. Nau Catrineta. OAL/Maria Leonor. Capela building of Afonso Lopes Vieira Museum House, Marinha Grande, Portugal. Around 1918 and 1922. (Nobre, & Magalhaes, 2010). ....	246
Figure 5-14. Nau Catrineta. OAL/Maria Leonor. Casa ALV of Afonso Lopes Vieira Museum House, Marinha Grande, Portugal. 1916. (Nobre, & Magalhaes, 2010). ....	246
Figure 5-15. The conch shell (above) and the scallop shell (below) in this panel is ex-libris of Afonso Lopes Vieira which is applied in various locations on the outside of the building alongside the entrance of the home of Afonso Lopes Vieira. Date back to around 1918-1922. ©Parinaz Faghihi. ....	247
Figure 5-16. Padrão dos Descobrimentos (Monument to the Discoveries). Designed by architect Cottinelli Telmo with sculptures by Leopoldo de Almeida and Soares Branco and António Santos as assistants.	

Inauguration 1960. Height – 56m; Width – 20m; Length – 46m. (“Monument to the Discoveries”, n.d.). .....	248
Figure 5-17. Primary digital simulation of Azulejos on the Sail Discovery project. ©Parinaz Faghihi.....	249
Figure 5-18. The primary sketches. ©Parinaz Faghihi.....	250
Figure 5-19. The primary sketches. ©Parinaz Faghihi.....	250
Figure 5-20. The primary sketches. ©Parinaz Faghihi.....	250
Figure 5-21. The primary sketches. ©Parinaz Faghihi.....	250
Figure 5-22. Primary digital simulation of the Sail discovery in site number 1. ©Parinaz Faghihi.....	250
Figure 5-23. Freehand sketch for the project. ©Parinaz Faghihi. ....	252
Figure 5-24. Sketch for the project. ©Parinaz Faghihi. ....	252
Figure 5-25. Sketch for the project. ©Parinaz Faghihi. ....	253
Figure 5-26. Final sketch for the <i>Discovery Sails</i> project. ©Parinaz Faghihi.....	253
Figure 5-27. Simulation of the placement of project in site number 1 at night from the eastern perspective- compare with the human scale. ©Parinaz Faghihi. ....	254
Figure 5-28. Front view of the project at night without needing any light sources. ©Parinaz Faghihi.....	254
Figure 5-29. Front View of the project in daylight. ©Parinaz Faghihi. ....	254
Figure 5-30. Top view of the project at night. ©Parinaz Faghihi.....	255
Figure 5-31. Top view of the project during the daylight. ©Parinaz Faghihi.....	255
Figure 5-32. The ex-libris of Afonso Lopes Vieira motif as an inspiration. ©Parinaz Faghihi.....	255
Figure 5-33. Simulation of the placement of the Discovery Sails project in site number 1 in daylight from the western perspective. ©Parinaz Faghihi.....	256
Figure 5-34. Simulation of the placement of the <i>Discovery Sails</i> project in site number 1 at night from the western perspective. ©Parinaz Faghihi.....	256
Figure 5-35. Simulation of the placement of the <i>Discovery Sails</i> project in site number 2 in daylight. ©Parinaz Faghihi.....	257
Figure 5-36. Simulation of the placement of the <i>Discovery Sails</i> project in site number 2 at night. ©Parinaz Faghihi.....	257
Figure 5-37. Steel frame and tempered glass.....	258
Figure 5-38. Details of the project from the side view. ....	258
Figure 5-39. Detail of the project from the top view.....	258
Figure 5-40. Detail of the tempered glass, painted glass, steel frame and beam, concrete .....	259
Figure 5-41. Detail of the project from the front view. ....	259
Figure 5-42. luminescent sands and stones sample of AGT™ company in daylight. ©Parinaz Faghihi. ....	260
Figure 5-43. luminescent sands and stones sample of AGT™ company in dark space after 1-hour exposer to the daylight. ©Parinaz Faghihi. ....	260
Figure 5-44. The prepared samples of AGT™ luminescent products before firing in the kiln. ©Parinaz Faghihi. .....	262

Figure 5-45. Result of fusing luminescent sand and stones of AGT™ company in 820 degrees and 850 degrees. ©Parinaz Faghihi.....	263
Figure 5-46. Fused Nemoto luminescent green frit on 3mm normal float glass at 600°. ©Parinaz Faghihi.....	264
Figure 5-47. Fused Nemoto luminescent green frit on 3mm normal float glass at 850°. ©Parinaz Faghihi.....	264
Figure 5-48. Airbrush in the ceramic workshop in the Faculty of Fine Arts of the University of Porto. ©Parinaz Faghihi. 22.01.2018.....	264
Figure 5-49. Sample 1: Green luminescent frit (from the Nemoto Co.) on 4mm normal float glass in daylight and dark space using the Fusing technique. ©Parinaz Faghihi (23.01.2018). ....	265
Figure 5-50. The process of making Sample 1. The luminescent parts are covered by liquid masking film, painted by airbrush, and fired in the kiln. ©Parinaz Faghihi (23.01.2018). ....	266
Figure 5-51. Sample 2. In daylight and darker spaces after 2 hours of natural daylight exposure. ©Parinaz Faghihi. 23.01.2018.....	268
Figure 5-52. Sample 3. The process of making sample 3. The last 3 images demonstrate the result of sample 5 in natural daylight and darker space. ©Parinaz Faghihi. 23.01.2018.....	268
Figure 5-53. Sample 4. In daylight. ©Parinaz Faghihi. 5.03.2018.....	269
Figure 5-54. The process of making sample 5. ©Parinaz Faghihi. 9.03.2018.....	270
Figure 5-55. The result of sample 5 in daylight and darker spaces after 2 hours of natural daylight exposure. ©Parinaz Faghihi. 9.03.2018.....	271
Figure 5-56. Pressionatecla Unipessoal L.DA Factory. Fafe, Portugal. ©Parinaz Faghihi (7.9.2011).....	272
Figure 5-57. These two images demonstrate the various cross-sections for aluminum frames. ....	272
Figure 5-58. An aluminum frame sample for the glass panels. ....	273

# Introduction

For many centuries, art was presented in public spaces around the world. However, it was only after the 1980s that public art has become an important factor to improve the quality of life in contemporary societies. Public art is a part of the societies' public history and part of the evolving culture. It reflects and reveals society's complexities and adds meaning to the cities. Public art has influenced human well-being during the past decades (Hu, Funk, Zhang, & Wang, 2014), as well as has contributed substantially to urban regeneration since the 1980s (Sharp, Pollock, & Paddison, 2005). These contributions involve: developing community awareness and social connections (Esche and Bradley, 2007); enhancing civic identity (Carmona, Heath, Tiesdell, & Oc, 2010); rising educational ethics; attracting companies and investment (Smyth, 2005); and attracting cultural tourism (Miles, 1997).

The choice of material used in public art installations is of vital importance in expressing artists' thoughts, motives, and emotions. Artists in Europe have recently employed glass to enhance and enrich public art. Transparency, translucence, and brightness have presented glass as a versatile material that can be shaped in cold, warm, and molten states through different techniques (Almeida, 2011), (Sarmiento, 2011).

In this thesis, Public glass art is studied as a public art piece that is executed in a contemporary urban context with glass as its primary material. We divide the glass art in Public spaces into three categories, 1) Architectural glass art, 2) Sculptural glass art, and 3) Public glass art. Public glass art is not referred to all of the glass art pieces in public spaces. This particular study does not discuss stained glass windows in religious constructions (as churches and cathedrals), or glass facades of buildings in contemporary architecture. It refers to a public art project with all of its features which is executed with glass.

To identify the reasons for how and why a glass artwork is successfully installed in a public space, we study different glass art techniques, as well as the recently invented practice that can be used in the creation of glass artworks in public space. Case studies were analysed to demonstrate the effectiveness of the techniques studied. Observing the curriculum of the artists that produced glass art in public spaces, we understand they have been specifically



educated in glass art at art schools or art universities. It discloses the importance of glass education to develop the artists' skills and creativity.

The artists and designers must understand the potential that glass offers and use it according to its *modus operandi*. Artists and designers traditionally provided the projects to be executed by skillful glassblowers or craftworkers in glass factories. It potentiated a harmonious relationship between artists, designers, and craftsmen. But this approach changed with the advent in the '60s of the Studio Glass Movement in America and Europe (Corning Museum of Glass, 2011), which contested the traditionally passive role of the artist and designer and determined a more 'hands-on' approach: the artists and designers became more aware of the necessity of learning the fundamental glass art techniques and thus being able to collaborate with skillful glass masters. This means to articulate university background with tradition to obtain better and successful results. "Craft education and practice are centered on a dialogue between creativity, materials, skills, and the artist developing ideas by combining conceptual vision with manipulation of the object" (Yair, Tomes, & Press, 1999, pp 514-515).

There is a long tradition of glass education in universities and high schools in European countries such as England, Latvia, and Nordic countries (de Roepstorff, 2000; Langhamer, 2006). For instance, the Department of Glass and Architecture in the Academy of Fine Arts and Design in Bratislava was established in 1965 (Balgavá, & Eliëns, 2005), the Secondary School of Glassmaking in Kamenický Šenov was founded in 1856 (Langhamer, 2006) and the glass engraving department at Edinburgh College of Art was established by Helen Monro Turner in 1941 (Blench, 1989). The literature on contemporary glass art and the research that we have done during this thesis, will show that public glass art is strongly influenced by glass education, as well as the economic status, cultural, and historical context of a society.

In this thesis, we choose Great Britain, Portugal, and Iran as case studies. Great Britain was chosen as a successful case study because of its long history in glass art (Evison, 2000), rich state of contemporary glass art in public spaces, and superior quality of glass education in art universities (please see more reasons for choosing Great Britain in this thesis in the motivation part). Then Portugal and Iran were chosen as case studies to suggest approaches for the improvement of glass art in their public space. Portugal has a great tradition concerning the

glass blowing industry and stained-glass production (Mendes, 2002) (Almeida, 2020) and Iran has a long history of glass making and using glass art in architecture (Faghihi, Quintas, & Almeida, 2017 b). Nonetheless, there are few examples of glass art in Public spaces in Portugal and Iran as glass education is only starting to emerge in these countries as we witness the increase of professional courses and university degrees in these two countries.

Research into glass art and public art is highly desirable. This thesis attempts to raise the question of how artists and the public in Portugal and Iran could benefit from having a deeper connection and experience in the field of public art and glass art. Contemporary societies are just beginning to recognize the importance of public art as an interesting possibility to communicate with wider audiences. Moreover, artistic concepts of glass art, particularly dichotomies between light and shadow, transparency and opacity, color and colorless, monochromatic and polychromatic, are explored in this research with the public glass art project proposal, Discovery Sails.

The extension of this introduction elaborates on the motivational attributes of this thesis, research objectives, the research methodology, and the thesis structure.

## Motivation

For me, it was like a journey, to study glass art and the way glass art has integrated and improved in public spaces. A journey with all its pleasant moments and difficulties, that gave me a new insight into Arts. It began in Iran, where I grew up and got my BA and MA degrees, continued in Portugal, where I started my PhD and explored the glass art possibilities. It developed in England, where I studied successful public glass art examples and interviewed glass artists and glass art professors and completed it in Portugal.

The motivation behind this research arises from my interest in glass art, public art, and the almost lack of presence and representation of public glass art in Portugal and Iran.

This research intends to study public glass art in a contemporary urban context, which means the current and recent state of glass art in urban public spaces. It means that the main focus is on the contemporary influences or recent activities and artworks related to public glass art in cities and urban areas, and a brief study on the history which made the present status.

The reason for choosing the contemporary urban context in this research is the acknowledgment of the tendency of people to settle in cities, which has increased rapidly in recent decades.

At the beginning of this investigation on public glass art, the questions came up one after another; what is public art?; what is glass art?; if public glass art is a subdivision of public art, what are the debates and issues that should be investigated?; what are the reasons for the lack of public glass art in some countries?; why some of them have more examples of public glass art while in Iran (where I grew up and studied) and Portugal (where I am living and doing the research) public glass art is rarely produced?; what are the reasons of public glass art visibility and improvement in other countries?; what are the obstacles in the progress of public glass art?

To find out the answer to each question, other questions were encountered that have built the structure of this thesis.

To perceive how to improve public glass art, it was essential to study successful examples of public glass art techniques and focus on public glass art improvement of a pioneer and resourceful country like Great Britain, which has a wide experience in this field. Then some approaches toward the development of public glass art for Iran and Portugal could be given, considering their cultural and social infrastructure and according to the research results of that successful country in this domain.

Portugal and Iran were the first options to start doing the research. The reason for these choices was related to the fact that Portugal was the place of the PhD course. Therefore, it was possible to study the obstacles to the improvement of public glass art and the strength of glass art in Portugal. Moreover, studying the glass education system, interviewing artists or glass art educators of Portugal was more accessible and direct. Iran was the place where I grew up, studied art, and know the culture and history better than other countries. Portugal and Iran had the same Arabic roots in some parts of their history, therefore, in their culture and history, the taste of Islamic art and culture was apparent/evident. In both histories of Iran and Portugal, the consequences of the dictatorship can be seen. Before and even after the Iranian revolution in February 1979, some critics such as Bozorg Alavi and Ali Shariati claimed<sup>1</sup> that the people of Iran experienced dictatorship during *Reza Shah*<sup>2</sup> and *Mohammad Reza Shah Pahlavi's*<sup>3</sup> era. Also, the Portuguese people experienced dictatorship when Salazar was in power for about forty years. Then in 1974 Portuguese people rose up against the dictatorship regime, and on April 25, 1974, ended the regime. During the dictatorship period, the influence of the Christian Church and faith were more evident in Portuguese society and customs, so their beliefs and creeds influenced Portugal's art and culture. After 1974, even though the path to democracy was not always smooth, the Portuguese made their way to freedom and liberty. The revolution of Iran in 1979 was different. Iranian, who were religious people, brought a religious government in power. So, today their culture and art are influenced by their government more than ever.

---

<sup>1</sup> There are many debates on the present and previous governments, who are/were in power in Iran. The arguments are about how they reigned and whether or not it was a form of dictatorship?!

<sup>2</sup> Reza Shah Pahlavi (1878-1944) was shah (king) of Iran from December 15, 1925 until the Anglo-Soviet invasion of Iran on September 16, 1941, which forced him to abdicate.

<sup>3</sup> Mohammad Reza Pahlavi (1919-1980) was shah (king) of Iran from 16 September 1941 until his overthrow by the Iranian Revolution on 11 February 1979.

Among all the pioneer countries in public glass art, such as United States, Canada, Germany, Great Britain, and the Netherlands, I have chosen Great Britain as a successful case study due to the following considerations:

- In the last century, Great Britain has not experienced dictatorships - other northern countries like Norway, Sweden, Finland also haven't-, while other European countries like Italy (Mussolini), Spain (Franco), Greece (Papadopoulos), Germany (Hitler) Portugal (Salazar) experienced dictatorships. So, in Great Britain, people get together in public spaces without fear of political surveillance or censorship. It naturally brought freedom of expression and provided a suitable context for artists to express their creative ideas freely and bring their imagination to public places, while in dictatorship countries, governments scare and prevent people from coming to public spaces and get together.
- Due to the cold and rainy weather in most months of the year, people stay indoors, while during the spring and summer people go outside and enjoy sunlight in outdoor public spaces as much as they can. People's tendency to enjoy outdoor public spaces when it is sunny is because they get sick of foggy and rainy weather (Wise, & Harris, 2017). These reasons encourage the municipalities to think about public spaces and build a space to gather people with different tastes and interests.
- According to a study released in November 2019 by the nonpartisan Pew Research, Great Britain has one of the highest levels of immigrants (U.S. News Staff, 2019). British people welcome other's opinions, cultures, philosophy, and values, then they let these aspects merge in their society and turn this multiculturalism in favor of their benefits. In other words, British people facilitate the act of cultural appropriation<sup>4</sup> which can involve the use of ideas, symbols, artifacts, or other aspects of human-made visual or non-visual culture. This feature paves the way for a dynamic society where every people can share ideas, cultures, arts, and communicate with others freely in public spaces.

---

<sup>4</sup> **Cultural appropriation** is the adoption of elements of one culture by members of another culture.

- Great Britain has a great history of glass art and public art. There are also several examples of public glass art in Great Britain and multiple glass art associations and individual glass artists whose glass artworks were installed in public spaces. This provides an opportunity to study glass art in public spaces as successful case studies, likewise, exploring the reasons for glass artists' success.
- There are several Art Universities, Colleges, public access and private studios, summer programs in Great Britain that offer glass art education. As far as glass art education plays a vital role in the improvement of public glass art, it has a long possibility of evolution in Great Britain. Studying glass education services can help to find approaches toward the development and enhancement of public glass art.

Therefore, the aspects mentioned above motivated me to choose Portugal, Iran, and Great Britain for my research.

## Research objectives

The following statement defines the principal objective of this research:

- Development of approaches to create glass artworks in public spaces based on personal reflections about the cultural history of Portugal and Iran.
- Research into the public art and glass art in public spaces, likewise, developing methods and approaches toward improvement and enhancement of glass art in public spaces in countries like Portugal and Iran, are the main goals of this research.

Taking into account the current state of public glass art in Portugal and Iran, the gaps in this field regarding educational programs, vandalism prevention methods, social, cultural, political, and economic issues in the development of this specific field of art, the objectives of this project aim to achieve are summarized below:

- To develop a methodological approach to comprehend and describe the cultural, political, economic, and social importance of public art and continue the same study related with public glass art.
- To identify the glass art techniques that have been used, as well as the recently invented glass art techniques that have the capacity to be used in the creation of glass art pieces in public spaces, presenting case studies.
- To study the following scopes in Portugal, Iran, and Great Britain: a brief history and current state of glass art, public glass art, and especially glass art education, as well as case studies of glass art in public spaces. This provides documentation and contextualization of the glass art in public spaces evolution by examining the technical improvements and educational developments of contemporary glass art in general, then draw a comparison between Portugal, Iran, and Great Britain.
- To identify practical methodologies for employing glass art in public spaces involving technical possibilities, educational impacts, and approaches toward

preventing vandalism on public art, and how to safeguard and protect the glass in public spaces.

- To conduct a project on glass artwork within the context of public glass art, in collaboration with the Glass Museum of Marinha Grande in Portugal and sponsors of the project.



## Research methodology

The factual investigation, creative transformation, and material manipulation formulate a strategy for making public glass artworks inspired by contemporary art contexts.

To achieve the objectives of this research, I have chosen the following methodologies:

- 1) Reviewing literature about contemporary public art and its issues, as well as glass art in public spaces;
- 2) Studying techniques that have been used in glass art in public spaces and its case studies, likewise the recently invented glass technologies;
- 3) Interviewing and communicating with people and artists as a key aspect to understand their thoughts, feelings, and experiences; these interviewed artists were related to glass art education and artists whose glass art pieces were installed in the public spaces. The names of interviewees are listed below:
  - a) In Great Britain:
    - i) Dr. Cate Watkinson (July 2020), Dr. Vanessa Cutler (June 2020), Dr. Kevin Petrie (July 2020), Dr. Jeffrey Sarmiento (June 2020), Dr. Jessamy Kelly (June 2020), Andrew Moor (August 2016, July 2017), Louis Thompson (July 2017).
  - b) In Portugal:
    - i) Dr. Fernando Quintas (November 2020), Dr. Teresa Almeida (April 2020), Joana Vasconcelos (November 2018), José Frade (November 2017), Fernando Carradas (November 2017), Conceição Cabral (November 2017 and 2020), Alexandra Abreu (November 2017), Joana Silva (May 2017, March 2018), João Silva (September 2016), Dr. Inês Coutinho (October 2017), Daniela Pinheiro (June 2020).
  - c) In Iran:
    - i) Dr. Arezoo Khanpour (November 2020), Hayas Hosseini (September 2018, and January 2016), Saeed Golkar (January 2016).
  - d) In the Netherlands:
    - i) Joost Van Santen (November 2016).
- 4) Studying history and current state of glass art in Portugal, Iran, and Great Britain;

- 5) Investigating vandalism and approaches toward its prevention of public glass art;
- 6) Studying the impacts of education on the improvement of public glass art, as well as glass education in Portugal, Iran, and Great Britain;
- 7) Personal reflection of the developed research, for defining and designing a public glass art project in collaboration with VICARTE, Glass museum of Marinha Grande, Cencal, AGT (Ambient Glow Technology) and Nemoto, to contextualize the position of personal creative practice in contemporary public glass art in Portugal.

To define the public glass art research, we require some knowledge about technical possibilities of glass, luminescent glass, and other material such as metal, aluminum, and steel, as well as techniques of painting on glass, hand printing and digital printing on glass, fusing, lamination, tempered/toughened glass. Therefore, some practical works were made at the Glass Workshop in the Faculty of Fine Arts of Porto University, under the supervision of Professor Teresa Almeida, from October 2014 to January 2018, as well as studying technical and new technological possibilities of glass art in Public spaces. Some interviews were made with artists, studio glass artists, companies that make frames with steel and aluminum, sponsors of the 'Discovery Sails' project, glass art professors, and lecturers in Great Britain, Netherlands, Portugal, and Iran. The interviews were conducted through email, online video conferences, and in-person.

# The Thesis Structure

This thesis is organized in the following chapters:

In chapter one, the subsequent issues were investigated: an introduction and a brief history of public art; the description of space, place, public space, and the differences between them (section 1.2); general definition of public art in the contemporary urban context is defined (section 1.3 and 1.4); the role of the audience and location in the placement of an object in public spaces (section 1.5); the challenges to public art which are included in cultural, social, political and economic scopes (section 1.6).

After mastering the subject of public art, it is beneficial to study glass art techniques and technologies that have been executed in public glass art projects, which is reported in chapter two.

In chapter two, the following issues were addressed: in section 2.1, glass art in public spaces is divided into three categories: 1) Architectural glass art, 2) Sculptural glass art, and 3) Public glass art, while the main focus is on the last category, public glass art; capacity of glass as a versatile material and the opinion of artists about employing glass in the creation of their artwork (section 2.2). In section 2.3 we present the techniques that have been used in contemporary public glass art such as Stained glass, Tiffany, Dalle de Verre, Film on glass, Lamination, Tempered/toughened glass techniques, Screen printing, Digital working methods on glass (Digital printing), Painting on glass, Layered glass, Blowing, Lampworking, Etched glass, Sandblasting, Kiln Forming (Fusing, Slumping), Kiln Casting (Casting, Sandcasting), as well as the impact of modern technologies on public glass art such as Dichroic glass; and the recently invented glass technologies such as Luminescent glass, Glass 3D printer, Water jet, Photovoltaic glass (section 2.4). In chapter two, the emphasis is on the potential of glass art techniques to represent the world, the identity of a culture, and a civilization.

In chapter three, we begin by a brief study on the history and the current state of glass art and public glass art in Portugal (section 3.2 and 3.3), Iran (section 3.4 and 3.5), and Great Britain (section 3.6 and 3.7). We also study some successfully executed public glass artworks in Portugal, Iran, and Great Britain and we argue the reasons for their favorable outcome. In

the remainder of the chapter, we introduce the artists, Joana Vasconcelos, José Pedro Croft, and Conceição Cabral, from Portugal (section 3.3); the artists, Monir Shahroudy Farmanfarmaian and Shirazeh Houshiary, from Iran (section 3.5); and the artists, Andrew Moor, Kristy Brooks, Danny Lane, Graham Jones, Brian Clarke, David Pearl, Amber Hiscott, and Cate Watkinson, from Great Britain (section 3.7).

In chapter four, the implications for the aforementioned combined context (in chapters 1, 2, and 3) presented an opportunity to explore the following scopes in the improvement of public glass art: understanding public glass art obstacles and study approaches toward the prevention of vandalism on public glass art (section 4.1); the methods to prevent vandalism of glass art in public spaces (section 4.2), and some vandalized and successful public glass art case studies were studied; The importance of education on the path of public glass art improvement (section 4.3) and the state of glass art education in Portugal, Iran, and Great Britain were studied; Several interviews from 2016 to 2020 were conducted with professors and instructors from Portugal, Iran, and Great Britain who were influential in developing glass art education in their regions. Eventually, in section 4.4, we discuss the educational and economic concerns on the improvement of glass art in public spaces in Portugal, Iran, and Great Britain.

In chapter five, we present a public glass art project to be installed in the vicinity of the Glass Museum of Marinha Grande in Portugal. The proposed project is called 'Discovery Sails' which has involved the following steps: a brief study on the history of Portugal and especially Marinha Grande to form the fundamental concepts and ideas in the project; defining the objectives of the Discovery Sails project; defining important elements such as location, characterization of social targets and the publics which may benefit from the project; considerations about criticisms of the project; and contextualizing the project. The execution of the Discovery Sails project includes the following phases: 1) ideation and brainstorm sketches; 2) design and digital simulation; 3) studying the technical possibilities and examining several materials and techniques for execution of the project; 4) communicating with factories and companies to get estimated prices for the materials and execution of the project; 5) communicating to find and get sponsors that provide some parts of materials, a space to create the project and a kiln free of charge; 6) studying strategies to prevent

vandalism in 'Discovery Sails' project; and, 7) the last step was sending the proposal to the municipality of Marinha Grande and get the final decision of the Municipality.

Finally, we conclude the thesis and discuss possible routes of research arising from this thesis and sum up the contributions of this work and concluding remarks.

# Chapter 1: Public Art

## 1.1 A Brief History of Public Art

Since the concept of 'Art' continually challenges and rewrites its definition, public art's definition will change during the times. Different categories of art in public areas such as mosaics, murals, sculptures, installations, music, and performance could help people to communicate with the complexities of the world. This makes life worthwhile and has a huge impact on our mood and emotions (Aguirr, 2010). According to Guetzkow, art has individual and community impacts on (1) health—builds interpersonal ties and promotes volunteering, which improves health; increases opportunities or self-expression and enjoyment which relieves stress; (2) cognitive psychology—increases sense of individual efficacy and self-esteem, improve human skills and creative abilities; (3) interpersonal abilities—build individual social networks, improve the ability to communicate ideas, increase tolerance of others; (4) economy—wages to paid employees, people spending money on buying artworks, attending the arts and on local businesses, increase the attractiveness of the area to tourists, businesses and investments; (5) culture—increase sense of collective identity and efficacy, builds community identity and pride, improves community image and status; and (6) social issues—build social capital by getting people involved, connecting organizations to each other and giving participants experience in organizing and working with local government and nonprofits; promotes neighborhood cultural diversity, reduces neighborhood crime and delinquency (Guetzkow, 2002, p. 3). Concerning the above-mentioned impacts of the arts, it can be inferred that all people (general public) can use and enjoy art's impacts when the art comes to the public spaces. This is what strengthened the position of art in the public space after the 1980s.

According to Sara Selwood (1995), after the 1980s the attitudes toward art have changed, so arts go out of the separated realm. She stated that after that change, art today is regarded as "an important economic sector which sustained employment, provided training

opportunities, and contributed to economic regeneration in a wider sense. Public art was both a highly visible and symbolic manifestation of that thinking” (1995, p. xv).

Art in Public spaces has historical roots in different periods and cultures and has also been linked to political, religious, and economic powers and its use and function which has been changed over time. This change is related to the possibilities and conditions in public life. The art we find in the public space is like many other artistic and aesthetic trends expressing the social and cultural status of a society of its time (Casanovas, 2005).

Throughout history, people have always attempted to interact and explore their environment through any kind of art such as painting, music (music performed or composed for religious ceremonies), dance (mostly in religious ceremonies), sculpture monuments, and religious sculptures. Many of these activities were carried out publicly or in public places. For example, the rock relief of *Triumph of Shapur I*, c. 241–272, (Figure 1-1) at Naghsh-e Rostam, Bishapour in Iran is depicted the victory of Shapur I over two Roman emperors, Valerian and Philip the Arab (Herrmann, & Curtis, 2002). This rock relief was a kind of public art of its time (Sassanid era) that demonstrated the glory of a Persian king by the support of the Mūbadān Mūbad<sup>5</sup> on a political victory. Although at that time, the term ‘public art’ did not exist, but in a way, the function of these kinds of works was the same as today’s public art objects. Every work of art in public space demonstrates the history and present status of its place. As Casanovas stated: “The presence of works of art always characterized its context, showed its history... the context determined the idea of space and time, establishing a positive relationship between the individual and ambient” (Casanovas, 2005, p. 19).

Before 1980, public art regarded as synonymous with “sculpture in open-air” but critic Lawrence Alloway stated, “It took more than an outdoor site to make sculpture public” (Selwood, 1995). Until 1980, many critics have attempted to describe and evaluate the creative methods of public art that regenerate and create urban public spaces (Zebracki, 2013). Rosalind Krauss mentioned previously that public art were static bronze structures, monolithic stone structures, commemorative representation, memorial monument but today

---

<sup>5</sup> Mūbadān mūbad is the high priest and the most powerful of the Zoroastrian Magi. Magi means ancient Iranian clergy and has been of three types throughout history. Mitra Magi, Maad Magi and Zoroastrian Magi. Zoroastrianism is Iran’s ancient pre-Islamic religion which persists in isolated areas and, more prosperously, in India, where the descendants of Iranian (Persian) Zoroastrian immigrants are identified as Parsis or Parsees.

contemporary public art is not simply an aspect of the landscape, it has moved further that of permanence and solidity, goes beyond murals, monuments, and memorials, it also looking for engaging the personal ideas and communities (Krauss, 1979).



Figure 1-1. *Triumph of Shapur I*. c. 241–272. Naghsh-e Rostam, Fars Province, Iran. © Diego Delso, License CC-BY-SA

In general, public art is defining as a permanent or temporary artwork (including social, critical, political, and contextual art practice) which is commissioned for openly accessible to everyone in public spaces (Kwon, 2004; Zebracki, 2014; Zebracki, 2013). If we define public art as a ‘commissioned’ accessible art in public space, it means that the art is ordered, paid, and is a property of the State which is usually found in exterior (Casanovas, 2005). This definition makes public art limited and as a commodity to display power, while public art can be a critical or a non-commissioned artwork that is happening or occurring in a public space. According to Wodiczko, when public art is bureaucratized, it imposes its significance and its purified result on the public. In this way, public art becomes the art that pretending to represent art. So, it loses its real aim and responsibility (Wodiczko, 1987). For example, Banksy is a street artist, political activist, and film director, active since the 1990s, whose paintings are not commissioned by any authorities. The work of Banksy shows a way to snatch power, territory, and glory from a greater and better-equipped enemy. His works can be considered as public art that is accessible to everyone in public places, provoke people to think about the dystopian future that our activities or the actions of politicians might bring (Zubkoff, 2016).



Street art is a critical, contemporary recognizable language for inhabitation of space users as Dominika Cecot describe:

Street art seems to be the most direct response of society to the culture of kitsch and consumerism. It is, in most cases anonymous, straightforward, and build-up of cultural symbols easily readable to members of the community they appear in. .... Street art is people's response to the architecture and urban planning. Street art combines art and ideology, by combining beauty with commentary on reality. What distinguishes it from other forms of public art is the fact that producers are consumers. The authors of the text stress the fact that the need or desire of self-expression lies in human nature (Cecot, (n.d.), p. 9) (Visconti, et al., 2010).

Therefore, public art can be produced officially or not, it can be commissioned by city authorities, or arise spontaneously. Some critics take the definition of public art even further and do not restrict it to public places as long as it is visible to the general public. Therefore, they state that public art can be on private property such as museums and art galleries (Zebracki, 2013; Miles, 2005). With respect to those who considered artworks in museums and art galleries as public art pieces, it should be said that in the contemporary urban context, these kinds of artworks are not public art as they are not site-specified and they are not usually created for all citizens but created for people who appreciate art, the art world or created for art's concern, not for the interest of the general public.

There is one thing in common in all the distinct definitions for public art that public art is the art designed to be available to everyone in public space. Therefore, what makes the definition of public art appropriate in the contemporary urban context is the definition of public space and public involvement. First, it is essential to define the notion of space and place, and afterward to define the notion of public space! Then, defining whether public art is the art that only requires to be in public space, or whether it can be in other spaces/places.

In this chapter, a general definition of public art in the contemporary urban context, as well as a description of space, place, public space, is provided. Moreover, the role of audience, place, and challenges to public art is argued.

## 1.2 Space, Place, and Public Space

Maia. H & Araújo (2014) in an article “space and place in urban culture” argued the meaning of space, place, and public space and the art’s responsibility on social transformation in communities. Maia & Araújo stated:

We can think of space in a broader definition and places as portions of space with meaning within. When space acquires meaning for an individual, it becomes a place and the places are important sources of common identity and individual, centers of human existence, with which people have strong emotional and psychological ties (p. 3).

Therefore, the meaning of space is more general than the meaning of place. When the notion of space specifies more specifically, it becomes a place. We cannot define the notion of space without a place as Yi-Fu Tuan (2005) describes:

The ideas “space” and “place” require each other for definition. From the security and stability of place we are aware of the openness, freedom, and threat of space, and vice versa. Furthermore, if we think of space as that which allows movement, then the place is a pause; each pause in movement makes it possible for location to be transformed into place (p. 6).

Space has a more abstract notion, but the concept of place is defined with material and objects. Yi-Fu Tuan (2005) stated, “place is a type of object. Place and object define space, giving it a geometric personality” (p.17). The place makes it possible to create and have memories. In other words, there is no memory without corporeal schema and body-based objects (whether it is the body that puts us in a place), therefore, places have a significant function in the fixation of memory (Maia et al. 2014). Memories shape our identities and it indicates the undeniable role of place and space in the creation of identity and eventually, culture.

Public space is the main stage of the construction and transformation of culture and creates collective memories. The public space, as José Pedro Regatão defines, is “a territory of political character that reflects the structure of the society in which it operates.” (Regatão, 2007) (Maia, & Araújo, 2014, p. 563). Na Xing and Kin Wai Michael Siu in an article called *Historic Definitions of Public Space: Inspiration for High Quality Public Space* stated: “Public space is an indispensable element of urban space and urban life” (Xing, & Siu, 2010, p. 39). They said that public spaces encourage the establishment of activities, and perfectly develop the residents' everyday lives. They added that public space as a part of urban landscape and place of historic identities has a different comparatively definition including “the Greek agora, Roman forum, medieval marketplaces, pizzas, residential squares and American city parks” (Xing, & Siu, 2010, p. 39). All of these places are essential requirements of today's urban space qualities.

It can be sum up in an extension of Regatão's, Na Xing's and Kin Wai Michael Siu's statements that public space is an open territory of political, cultural, environmental, social, and economic character accessible to the general public that demonstrates the society's structure in which it operates. Here, the '*general public*' means everyone or ordinary people regardless of gender, race, ethnicity, age, or socio-economic level whose occupation or social status can be anything. In this sense, we can infer that the public space of a society indicates an overview of the culture and identity of a community. It means that whatever is in the public space (such as public art) has an impact on the identity and culture of that place and people who live or pass there. The above definition raised a question: 'Can every space that is accessible to the general public, considered as public space?' This issue is about whether spaces like cafes, shopping centers or social networking websites (e.g. Facebook) are public spaces! To answer this question, we need to know what kind of spaces we have. The notion of space is described in various fields such as mathematics, physics, cosmology, spatial measurement, geographic space, psychology, and social sciences. The theory of 'what space is' is also defined by philosophers and scientists such as Descartes, Leibniz, Newton, and Kant (Arthur, 1994) (Agnew, 2011). With regard to the topic of this thesis, it is only attempted to describe the concept of space in the urban context. Therefore, other notions of space in different fields are not addressed.

According to Casanovas: “Urban space can be defined as a series of gradations between public and private use.” He added:

it is evident that the concept of public art is closely linked with that of public space, understood as common ground where people carry out the function activities and ritual that bind a community, whether it is in the normal daily routine or the periodic festivities (2005, p. 20).

In this regard, De Solà-Morales (1992), Scheerlinck (2012), and Dissanayake (2013) argued that in the urban context, space is divided into four main categories: 1) public, 2) private, 3) semi-private and 4) collective.

Although the concepts of public and private spaces have revised over time, public space has held a major ideological position in democratic societies since the Greek republic (Drummond, 2000). The meaning of public space “represents the material location where the social interactions and political activities of all members of ‘the public’ occur” (Mitchell, 1995, p. 116). Drummond (2000) described:

Private space, in this conceptualization, is the domestic space where social reproduction occurs more or less free from outright control by outside forces such as the state. Public space is the space ‘out there’ which belongs to the whole community, although regulated by prevailing social and legal norms. The two are distinguished also by the conceptual separation between home and work, reproductive and productive space, (...) outside and inside (p. 2379).

There are some private places that are open space such as shopping centers that only under some constraints, individuals can use, it is *collective space*. Regarding the definition for collective space, Scheerlinck (2012) claimed: “Collective spaces are no synonyms for areas forced between clearly private and public spaces: they are time-dependent stretchable horizontal interfaces, often including private or public properties. Collective space is no

synonym for intermediate space<sup>6</sup>, it can contain it” (p. 13). In other words, “Collective spaces are not strictly public or private, but both simultaneously. These are public spaces that are used for private activities, or private spaces that allow for collective use, and they include the whole spectrum in-between” (Graafland, Kavanaugh, & Baird, 2006, p. 511). There are several artworks in collective spaces that are called public art while they are art in public space such as entrance chandelier of Victoria & Albert museum installed by Dale Chihuly, (Figure 4-12) and there are artworks in collective spaces that are public art due to their features (Figure 1-12). Thus, returning to the aforementioned question ‘Can every space that is accessible to the general public, considered as public space?’, we can answer this question saying ‘no’, every place that is accessible to everyone is not definitely a public space, while it can be collective or semi-public space! Collective spaces can be considered as a subset of the public spaces, since it has private sector and properties, it cannot be considered as a public space. Places such as cafes, shopping centers, and museum can be considered as collective spaces and the artworks which are placed in collective spaces can be define as public art, or art in public space, depending on the type of the artwork and its features. Moreover, social networking media are virtual public spaces, not physical ones.

The place is not just what was there, but also is the interaction of the things in there and what's going on there (Fleming, 2007). Place-making is a considerable discussion on urban design and regeneration, also has a significant impact on the sense of place. In this regard, Al-Kodmany stated: “Place-making is the act of creating an urban landscape that fosters pride and ownership of the physical and social environment. A sense of place is the emotion that one develops from comfort, satisfaction, and attachment with a given area” (Al-Kodmany, 2013, p. 153). Place-making is used to regenerate the dead spaces or to design the bare spaces. Places produce an emotional effect on people by meaning-making and by creating memories (Fleming, 2007). Place-making “cure the condition of dead space that tells no tale” (Fleming, 2007, p. 19). Place-making creates links and connections, engages people, and forges bonds between people’s emotions and identity, artwork, culture, memories, and spirit of the city.

---

<sup>6</sup> Intermediate space is “a transitional space generally used exclusively for circulation. Corridors & foyers are a good example. In some cases, to create an air gap of sorts or to enable a good user experience a vestibule or a room is introduced that is a transitional space” (Quora, n.d.).

WAUA is a blog written by Fredrik Torisson who has got his PhD at Lund University in architectural theory, explaining the difference between semi-public and semi-private spaces (Figure 1-2). According to him, the meaning of semi-private space is defined as:

a space that is access controlled and accessible to residents and associated people only. An example here would be a communal staircase in a residential building with controlled front door access. These spaces are not really private since they're shared, but since they're usually inaccessible to outsiders, they're not really public either (Torisson, 2010).

It is also explained that semi-public space is defined as “a private space accessible to the general public, e.g. a shop or a Public house. In this context, however, I'll define it as a space open to the public but has a certain private character to it” (Torisson, 2010).

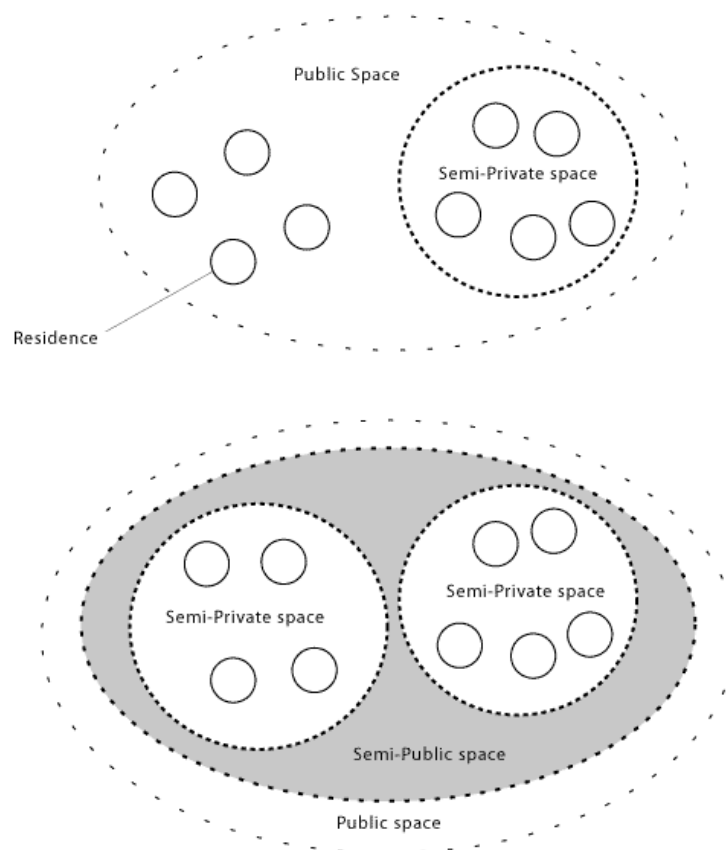


Figure 1-2. This image shows the difference between semi-public and semi-private spaces. © (Torisson, 2010).

### 1.3 Public Art: The General Definition

After defining space, place, public space, and public place, it is better to turn back to the primary issue, the definition of public art. The definition of public art today should include the diverse variation of its placement and integration. In this regard, public art in an urban context (urban context is determined in section 1.2) can be defined as an artwork for all citizens (by all citizens we state that they can specialize in art, or not) which is accessible in an open physical (not virtual) public place that has a purpose (regeneration, or beautification of the city, or political, cultural, economic, environmental or critical purposes) and gives or creates identity and history to a public space. Moreover, public art engaging the personal ideas and communities (even engage people's minds or attract their attention), provoke debates while it can be executed in any style, forms, materials, or scale (Maderuelo, 1990; Casanovas, 2005). In the other form, according to Maderuelo (1990), Casanovas (2005), Brown (2005), Regatão (2007), Kiefer (2014), and Zebracki (2013) (2014), it can be said that public art includes the following features:

- Created for all citizens;
- It is accessible in an open physical (not virtual) public place;
- It has a purpose (regeneration, or beautification of the city, or political, cultural, economic, environmental or critical purposes);
- It could be site-specific, place-specific, or stand as opposed to its surroundings;
- It gives or creates identity and history for public space and changes a public space to a public place;
- It can engage people (even engage their minds or attract their attention) and provoke debates, and people's imagination;
- It can be executed in any style, form, materials, or scale (Maderuelo, 1990; Casanovas, 2005).

The principal aim of public art is to engage with its multifaceted audience and “to create spaces within which people can identify themselves by creating a renewed reflection on

community, on the use of public spaces or our behavior within them” (Sharp, Pollock, Paddison, 2005, p. 1004).

Different audience in distinct localities and culture shows a significant difference in the perception of public art. These different perceptions lie in the “public’s cognitive, spatial, aesthetic, social and symbolic proximity to both the public art and its site” (Zebracki, 2013, p. 303). Therefore, the creation of public art is needed extensive research into cultural geography, place, and space of the public art installation, as well as the cultural identity of the people who may pass and live there. For example, creating a public art piece for Eastern countries is entirely different from a middle-eastern country like Iran. For instance, today, Iran has an Islamic culture that strictly forbids painting or installing women’s sculptures without a hijab or naked women in public spaces. Even before Iran’s revolution in 1979, there were rarely installed or painted women in public spaces due to the Iranian Islamic culture and background. During the 8-year war between Iran and Iraq (1980-1988), and a decade after the war, Iran didn’t have any significant public art, just sculptures in public places such as squares and murals which were mostly a tribute to the bravery of the Iranian martyrs and youth in the war and battlefields (Figure 1-3). While over the last two decades, the country has changed this attitude, so because of more stability<sup>7</sup>, there have been more cultural and non-memorial murals, sculptures, and public art in Iran. Figure 1-4, Figure 1-5, Figure 1-6 are examples of public art in Tehran.

As it is mentioned, the audience perception of public art is different. They may approve a public art piece and admire it or despise it; therefore, they can keep it or remove it. Nevertheless, a public art piece has a direct impact on people and revives the desolate public place. Sometimes installing an avant-garde public art raises many debates on a society.

---

<sup>7</sup> In the last 20 years from the year 2000 till now, political and economic stability, as well as the stability of lifestyle behavior, increased in comparison with the first years after Iran’s revolution and after the Iran-Iraq war.





Figure 1-3. *Martyrs of the Bahrami brothers*. Mural. Tehran, Iran. 242 square meters.



Figure 1-4. *Baharestan*. Manely Manouchehri. 2016. Tehran, Iran.



Figure 1-5. *It is always raining in Seyed Khandan*. Farzaneh Abdoli. 2016. Tehran, Iran.



Figure 1-6. *Paper windmill*. Javed Asadzadeh. 2016. Tehran, Iran.

Caroline Levine<sup>8</sup> in an article titled *'The paradox of public art: Democratic space, the avant-garde, and Richard Serra's "Tilted Arc"'* discussed the debates over a public art piece created by Richard Serra, Tilted Arc (Figure 1-7), which was built for a public square in downtown Manhattan in 1981. It was demolished five years later, facing intense public outcry. She explained that *Tilted Arc* designed site-specifically for Federal Plaza in Manhattan built by 0.5% of the total cost of the building in an avant-garde, postmodern way. This arguable public art was a 120 feet long curving wall made out of red Cor-Ten steel. Instead of focusing on the piece, Serra aimed to attract attention to the place itself and on the people who use it by reflecting and disturbing their movement through it (Levine, 2002). When the Tilted Art was installed, hundreds of complaint letters were written against the artwork. It prompted the GSA's New York Regional Administrator to hold an open public hearing for three days in March 1985. After the speech of one hundred and eighty oppositionists and supporters of this work (122 for preserving Tilted Arc in the newly renamed Jacob Javits Plaza, 58 for its removal), the final decision was the removal of the Tilted Arc in March of 1989 (Figure 1-8).

Artists, critics, politicians, and members of the public who were the defenders of the Tilted Arc asserted that the piece was a chance to 'educate the public out of their dislike'. This is the function of avant-garde public art to be radically original and resistant to the popular taste, which is the consequence of mass culture (Cecot, n.d.). Although this work of Richard Serra was removed from the public space, it created many discussions, debates and made people thinking of what it is and what is the function of that public art in that place while it is not beautifying the place as people expected<sup>9</sup>. In this regard, Sara Selwood said public art "may ultimately represent a battleground between the artist's freedom of expression, and the public's right to choose" (Selwood, 1995, p. 7).

---

<sup>8</sup> Caroline Levine is an Assistant Professor of English at Rutgers University in Camden, where she teaches aesthetics, nineteenth and twentieth century literature, and women's studies. She spent her life wondering how and why, particularly in democratic societies, humanities and the arts matter. She is the author of three books, *The Serious Pleasures of Suspense: Victorian Realism and Narrative Doubt* (2003, winner of the Perkins Prize for the best book in narrative studies), *Provoking Democracy: Why We Need the Arts* (2007), and *Forms: Whole, Rhythm, Hierarchy, Network* (2015, named one of Flavor wire's "10 Must-Read Academic Books of 2015") (Levine, n.d.).

<sup>9</sup> There was an option that the piece could move to another place while the artist didn't accept. Because he said "It is a site-specific work and as such is not to be relocated. To remove the work is to destroy the work" (Kammen, 2006, p. 239).



Figure 1-7. Titled Arc. Richard Serra. Manhattan, New York, USA. 1981. ©Photo: Anne Chauvet.



Figure 1-8. Removal of Titled Arc. Richard Serra. Manhattan, New York, USA. 15 March 1989. ©Photo: Jennifer Kotter.

Sometimes public art provokes debates because of its size, for some people it can be a strange or enormous object. *ArcelorMittal Orbit* (Figure 1-9) by Anish Kapoor and Cecil Balmond, with 376 feet tall is the largest public art piece in London which is built on-site as a landmark to commemorate the London 2012 Olympic and Paralympic Games. Boris Johnson who was the London mayor planned a £ 15 m memorial to compete with the Eiffel Tower and seal his legacy. This public art was funded by the steel magnate Lakshmi Mittal, Britain's richest man (Gourlay, & Ruiz, 2009). Mayor Boris Johnson describes the reasons for the construction of the tower in an egotistical statement in the introduction to the ArcelorMittal Orbit brochure: deriving from a need of 'something extra' for 'the greatest city on earth' (Cecot, n.d.). This statement caused many negative reactions. The debates around this giant public art were because the commander and the sponsor are showing off their richness and power while the visual and Avant-Gard style of the Orbit became the secondary matter (Cecot, n.d.). Nevertheless, one of the functions of public art in democratic societies is provoking debates around art, culture, economy, politics, and power.

Public art is not restricted to a specific size, amount, or the medium of which it is built, while can emerge in: mural painting, open-air sculpture, outdoor kinetic sculpture installation, music, dance, performance, monuments, memorials, and civic statuary,

landscape contextual art, relational art, participatory art, activist art, dialogic art, community-based digital art (which is socially engaged new media art), or more comprehensive artwork. The expression in Public art is open-endedness as public art encompasses place-making, environmental activism, cause-related art, sound installations, interdisciplinary performance events, community-based initiatives, and much more social and artistic possibilities (Becker, 2004).



Figure 1-9. *ArcelorMittal Orbit*. Anish Kapoor and Cecil Balmond. London, UK. 2012. ©ArcelorMittal Orbit.



## 1.4 Public Art in The Contemporary Urban Context

In this research, we study public glass art in the contemporary urban context. For this purpose, first we define the concepts of contemporary, urban and context.

*Contemporary* means belonging to the present and happening or done in recent times. The word *context* is defined as “(1) the situation in which something happens and that helps you to understand it; (2) the words that come just before and after a word, phrase or statement and help you to understand its meaning”<sup>10</sup>. The *urban area* is characterized as cities and towns (not rural area) with high population density and concentration of residential locations (National geography, n.d.). The reason for choosing the contemporary urban context in this research is that in the recent decade the tendency of people to settle in cities has increased more and more. The immigration of people to larger cities requires policymaking and the regeneration of the urban and cultural context. The investigation shows after the 1980s, policymakers and artists used public art as a tool to “put cities on the map in city-marketing and urban regeneration logic, play out political issues, make cities and regions more interesting to investors, aestheticize the environment, and promote the social cohesion, community engagement, social movement and cultural empowerment” (Zebracki 2014, p 1-2).

Currently, public art rejuvenates the built environment and public spaces of the cities, builds bridges between past, present, and future, as well as between different ideas, opinions, and beliefs. Through public art, cities and places gain value (cultural, economic, and social value) by the help of culture and policy since urban planners and policymakers, investigate approaches for cultural regeneration (Landi, 2012).

There are many examples of public art around the world in a contemporary urban context that restoring and reviving the place. For example, the works of Portuguese artist Alexandre Farto (b. 1987) known as Vhils interact visually with the urban environment. Vhils creates surface scratched public art projects with the groundbreaking bas-relief carving technique.

---

<sup>10</sup> The definition of context in Oxford dictionary.

His public arts are site-specific and reflecting on identity and life in contemporary urban societies and their saturated environments (Vhils, n.d.) (Figure 1-10 and Figure 1-11).



Figure 1-10. *TEDx Aveiro*. Vhils. Aveiro, Portugal. 2012. Photo: Smart B. ©www.vhils.com.



Figure 1-11. *Programe d'art mural*. Vhils. Ville de Montréal, Canada. 2017. ©www.vhils.com.

## 1.5 Audience and Place in Public Art

The new explanation for public art in the contemporary context is more emphasizing on audience interaction with public art within their environment, while the traditional description of public art focused on the artwork (Fakhar & Shahab, 2018). Audience presence, attitudes, views, and perceptions toward the artwork in a public space are debatable. The way the audience perceives and attitudes toward public art plus the direct and indirect effects of the artwork on the audience in public spaces are complementary to and part of the artwork.

Today some people who live in a contemporary democratic society need to see the impact of their actions and decisions on society. This could be an approach for authorities and municipalities to create and build places that are responsive to the communities. Mary Griffiths raising questions about the making of responsive places and urban public. She also argued: “the democratic governance of data which allows a city to 'talk' to its inhabitants requires the adoption of participatory, inclusive practices from those designing responsive places” (Griffiths, 2016, p. 28). A responsive place is a democratic environment that provides appropriate possibilities for citizens and the audience to express themselves and meet their

needs (Fakhar et al. 2018). Fakhar and Shahab argued several features of responsive environments such as:

“1) Permeability: which is the quality that provides the accessibility of one place.

...

2) Variety: When an environment has different characteristics such as formal, function, and meaning perception, variety occurs in the space. ...

3) Legibility: ... a concept for explaining spaces, which are not chaotic, and one may conveniently find their path in it. This attribute makes the environment more understandable which citizens can recognize it easily.

4) Robustness: ... The environment with the ability to respond to constantly changing situations, demands, and produces more capacity for different activities. This flexible characteristic occurs at different levels. In the first step, users adapt themselves to the space to fulfill their demands. In the second level, Users change some features of the space. In other words, space adapts itself with users. Eventually, users leave space since it doesn't have enough robustness to meet users' needs. Flexibility is what makes space sustainable in the long run, and ensures the presence of people in the environment. People are flexible creatures. Humans are constantly changing and they get their surrounding change to be suitable for their desires.

5) Visual appropriateness and Richness: The design of the exterior appearance of urban plazas that attract different scenes in the space is called visual appropriateness and richness. The proportion of space to mass and visual appropriateness are even more important in crowded spaces with variation” (Fakhar et al. 2018, pp. 60-61).

For instance, responsive public art is a sign of a responsive environment that could provide a sense of presence and participation in the city's activities. *'A light Touch'* is an interactive and responsive public art in a collective space (a shopping center in Canberra Center in Australia) (Figure 1-12). This wall displays a project that is a part of the Enlighten 2016 event

which provides an interactive experience while colors change, on or off by human touch (Griffiths, 2016).

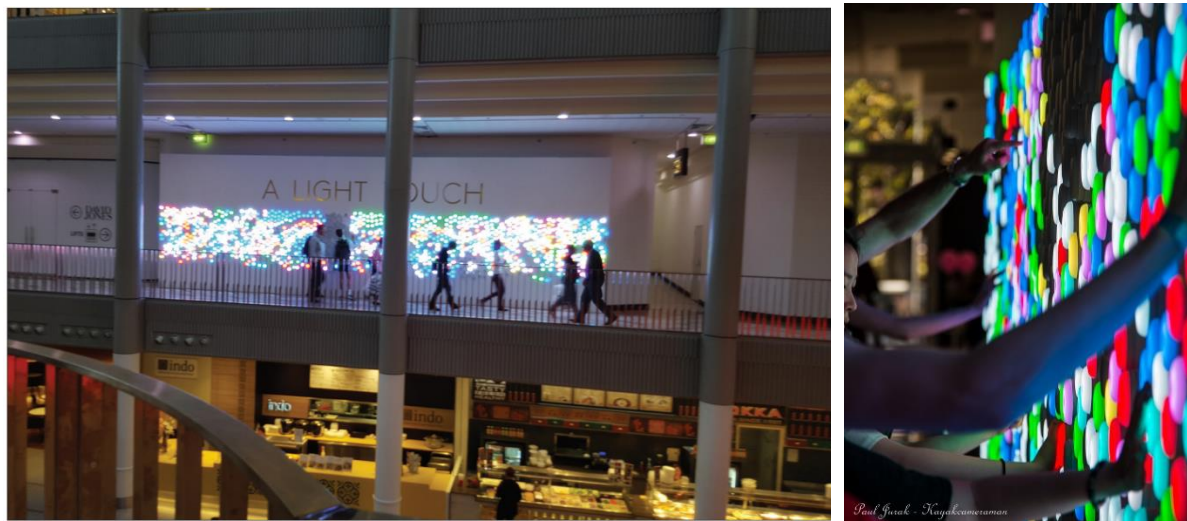


Figure 1-12. *A Light Touch*. Canberra center. Australia. 2016. Left image ©MGriffiths,23 April 2016. (Griffiths, 2016, p. 33). Right image ©Paul Jurak.

*A light touch* is an example of public art in collective space because it creates an interactive place that connects and engages the audience with each other and with the creation of art. The best part of this enjoyment is that everybody regardless of their age can touch, play, and change the lights' colors, or can leave a message in glowing lights. In fact, every touch and every action could affect the whole display of the wall. This public art reminds people that every action/step they take could change the overview of the society they live in. In addition, it brings a sense of equality (as it could be used and enjoyed by all of its audience regardless of their age or sex), and liberty (audience are free to change the colors and touch the artwork).

Public art could be site-specific, place-specific (Fisher, 1996), or stands as opposed to its surroundings. When public art is created to be installed in a certain publicly owned location while losing its meaning in other locations, it is site-specific (Schacter 2013) (Fisher, 1996). *Titled Arc* (Richard Serra) and *Cloud Gate* (Anish Kapoor) are site-specific public arts while *Maman* (Figure 1-13) the big spider next to Guggenheim Museum in Bilbao is standing in contrast to its surroundings. According to David.H Fisher, place-specific public art is “a creative product resulting from a collaboration between the artist and a community like the work of the ‘Culture in Action Project’ in Chicago” (Fisher, 1996, p. 43).





Figure 1-13. *Maman*. Louise Bourgeois. Guggenheim Bilbao Museum. 1999. 927 x 891 x 1023 cm. © FMGB Guggenheim Bilbao Museoa, 2019.

David Fisher described that it does not matter whether public art is site-specific, place-specific, or stands in contrast to its surroundings, the act of placing and performing a creative expression as an artwork in public space changes how that place is seen, and how audience see the work. He added, “if (the artwork) noticed and engaging, it may also alter the way in which both artist and the audience see themselves and their worlds” (Fisher, 1996, p 43).

## 1.6 Challenges to Public Art

While The definition of Public art itself is a matter of debate, the impacts of public art on culture, identity, the economy of a community/society, and political mainstreams represent challenges and arguments. According to Sara Selwood in which public art’s notion can be categorized: “Some employ the concept of form, function, and constituencies of interest to describe public art.... Others emphasize place and time – past, present, and future” (Selwood, 1995, p. 7). The other arguable issues on public art are:

- Public Art function in a society/community improvement;

- The impacts of public art on a place's culture, identity, and history;
- Public art's educational influence on a society/community/people;
- The impact of public art on stimulating the economic wheels of a society;
- The Impact of politics on public art and public art on Politics;
- Environmental impact of public art on society.

In the following sections, cultural, social, political, and economic scopes are addressed.

### **1.6.1 Cultural scopes**

Since the Victorian times, *culture* has been used as an expression and demonstration of a dynamic economy and civic pride; continuously, in the last forty years, city governments have developed cultural strategies as an instrument for city marketing and as a means of motivating local economic development (Wansborough, & Mageean, 2000). It is fundamental to clarify the meaning of *culture*, as Dr. Michael Williams says: “the culture of society consists of the values, meanings and material items shared by its members” (Williams, 1986, p 27). He explains that culture is an ordinary and intuitional behavior which has two fundamental features: it is learned, and it is shared.

A wide variety of approaches has been used for sharing, learning the culture and characterizing the cultural regeneration, such as urban design. Urban design is about connecting people and places, movement and urban form, nature and the fabric that has been constructed. The urban design combines the different ideas of place-making, environmental stewardship, social equity, and economic viability to create areas with different scenery and identity (Urban design, n.d.). In urban design, public art plays an important role in the expression and development of the culture of an area. Public art is a tangible reflection of the cities' quality of life and expected to improve the urban residential environment (Wansborough, & Mageean, 2000). Public art contributes not only to the urban regeneration but also towards the visual attractiveness, aesthetic terms of urban spaces (Hall, & Robertson, 2001), and cultural heritage. This contribution involves economic, social, environmental, and psychological issues.

Public art is a part of our public history, part of our evolving culture, and our collective memory. It reflects and reveals our society and adds meaning to our cities. Cultural heritage is all the remnants of the past with cultural value which includes tangible (such as ancient buildings) or intangible (such as the customs of a region) works that are from past generations, preserved now, and in benefit of future generations (Cortes, 2013). It demonstrates its place and time, indicates the identity and culture of a place. It reveals what kind of a place/city it is and what aspects of a place is needed to be noticed and to be seen. Strong and successful public art breaks the trend of sameness and flavorless; instead, it provides a stronger sense of identity and culture. Public art encourages people to pay attention and perceive more deeply the environment they occupy. It provokes the public's imagination and creativity, stimulates people's interest in art, culture, society, and the interconnection between them.

### **1.6.2 Social Scopes**

Public art brings arts in public places and to the daily lives of the people who may have not enough time to go to the museums, galleries, or art events more often, so, they experience, encounter with the art and engage social interactions (Sharp et al, 2005). '*Cloud Gate*' (Figure 1-14) by Anish Kapoor is one of the best-known attractions of Chicago since it was introduced in 2006 (Dafoe, 2019). This public art is an excellent example of the features mentioned above that engage people and families around itself and creates a shared experience. Anish Kapoor properly explained '*Cloud Gate*' as:

'*Cloud Gate*' reflects the space around it, the city of Chicago. People visit the sculpture to get married, to meet friends, to take selfies, to dance, to jump, to engage in a communal experience. Its mirrored form is engulfing and intimate. It gathers the viewer into itself. This experience, judging by the number of people that visit it every day (two-hundred million to date), still seems to carry the potential to communicate a sense of wonder. A mirror of self and others, both private and collective, '*Cloud Gate*' – or the '*Bean*' as it often affectionately

referred to – is an inclusive work that engages public participation. Its success has little to do with me, but rather with the thousands of residents and visitors who have adopted it and embraced it as their ‘Bean’. 'Cloud Gate' has become a democratic object in a space that is free and open to all (Kapoor, 2018).

This giant public art attracts people because of its particular shape (it looks like a bean or drop of liquid mercury). Moreover, it creates history and memory for a city that doesn't have historical sites or attractions like Paris, or Rome have. These recently built public art objects in the United States create culture, identity, and history for the city and its inhabitants.



Figure 1-14. *Cloud Gate*. Anish Kapoor. Millennium Park, Chicago, USA. 2006. ©Anish Kapoor.com

Public art is one of the factors that improve the sense of community (Francis, Giles-Corti, Wood, & Knuiman, 2012). The authors, Francis, J., Giles-Corti, B., Wood, L., & Knuiman, M. (2012) defined sense of community as “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together” (p. 104). They also explained the sense of community “improves wellbeing, increases feelings of safety and security,

participation in community affairs and civic responsibility” (p. 401), as well as increasing physical and mental health.

The creation of public art is a product of group efforts which is a collaboration between artists, architects, civic leaders, elected officials, administrators, design professionals, approval and funding agencies, and construction teams. For a public art project, the artist is asked to bring her/his creative and artistic designs/ideas, then execute it through a collaborative process. This collaboration is a challenge for those who advocate the commissioning of a public art project, in many aspects such as: creating opportunities for artists meanwhile negotiating with the government, institutional bureaucracies, regulations and budgetary; as well as taking into account the community expectations; justifying what this specific public art could add to a place or if it is a proper decision to choose such artwork for a place. In addition, it is a challenge for an artist to understand the restrictions, necessities, and essentials of the place that she/he is going to install the work regarding her/his creative process and investigations. Moreover, it is a challenge for each individual to maintain this dynamic engagement of personal and public identity.

One of the social benefits of public art is its educational feature (it is described more in chapter 4, section 4.3). Learning occurs when the question is raised. Public art prompts questions about the environment, and ourselves (Kiefer, 2014). It encourages people to challenge, educate, and illuminate themselves when they encounter questions raised by public art.

According to Darts (2006), if society accepts to use art and bring it to public spaces as a phenomenon of human behavior to create symbols for communication and change the experience of being in a public area, then art is linked to everyone and is for all. Only in this case, the art could be considered as one of the main communication systems of social interaction on a society in transition. In this case, society needs to be a democratic one, otherwise, even bringing art in public areas doesn't link to everyone. Imagine that in societies/communities with dictatorship, if there is public art, it is limited to the desire and ideology of the authorities in power and has no connection with the other's points of view (especially dissidents' views) in society.

### 1.6.3 Political Scopes

Regarding the changes and challenges of contemporary societies, public art is further than just a production of artistic objects. The artist needs to be aware of the social power of art and trying to better understand the struggles we (artists) each participated in establishing identities and meaning-making in transition society (Darts, 2006).

Sometimes the artists use different tactics and strategies to confer social and political issues to the audience outside the art world. This could be a provocation, participation, or generating dialogue and debate among the general public in the public sphere. In these kinds of public spaces, “artists can be described as ‘educators’ who are teaching the public about the connections between public spaces and private interests” (Desai, Darts, 2016, p. 189).

Throughout history to the present day, public art has been used for political purposes. The statues of the politicians, philosophers, and other celebrities were made (and still are made) to commemorate their memories, also to emphasize the impact they had/have on the society, or to demonstrate that their way or point of view is still appreciated by the community. These statues (not only statues, but sometimes murals, low relief, and also some sculptures that are placed in roundabout or squares and buildings) are accepted as part of the everyday use of the city (Sharp et al, 2005). For example, the statue of D. Afonso Henriques (the first King of Portugal) made by João Cutileiro<sup>11</sup> in 2001 in Guimarães, Portugal (Figure 1-15) or the bronze sculpture in the memory of General Humberto Delgado<sup>12</sup> (Figure 1-16) made by José Rodrigues<sup>13</sup> which was inaugurated on 14 May 2008 (Digital Harbor Museum, n.d.) could be

---

<sup>11</sup> João Cutileiro (born on 26 June 1937 and died on 5 January 2021) was a contemporary Portuguese sculptor. His public sculptures are known and installed in different cities in Portugal.

<sup>12</sup> In 14 May 1958 General Humberto Delgado gave a speech in front of ten thousand of people during the campaign for the Presidential Elections in Sao Bento train station above the Café Luso. On that speech he said a memorable phrase: “My heart will stay in Porto” (Digital Harbor Museum, n.d.)

<sup>13</sup> José Rodrigues (born on October 21, 1936 in Luanda, Angola, and died on September 10, 2016 in Porto, Portugal) was a sculptor who explored different aspects of the field of sculpture, making his enormous work in the public space especially in the city Porto, where we can find the most austere works, such as the Obelisk (1974) of the Faculty of Economics, Keeper Sol (O Guardador de Sol, 1963) of Faculty of Fine Arts of University of Porto (where José Rodrigues began his important career as a student and later as an associate sculpture teacher), the most controversial and iconic works as the Cube (1900 kg, installed in 1984) or the Monument of D. Antonio Barroso (1999).

examples of sculpture in public space (not a public art) which today is a part of everyday life of people.



Figure 1-15. D. Afonso Henriques. João Cutiliero. Guimarães, Portugal. 2001.



Figure 1-16. General Humberto Delgado. José Rodrigues. Porto, Portugal. 2008.

But sometimes, the sculpture in public spaces could be considered as public art and can elicit greater ideas for political and human rights purposes. For example, *Non-Violence*, also known as *The Knotted Gun* is a sculpture in public space that can be considered as public art (not just a sculpture in a public space) (Figure 1-17). It is a bronze oversized Colt with its muzzle tied by Swedish artist Carl Fredrik Reuterswärd<sup>14</sup> as a memorial tribute to the legendary singer and songwriter John Lennon<sup>15</sup> in 1980 (Cespedes, 2016). We consider it as

---

<sup>14</sup> Carl Fredrik Reuterswärd (4 June 1934 – 3 May 2016) was a Swedish painter and sculptor.

<sup>15</sup> One of the most famous songs of John Lennon is *Imagine*: “Imagine all the people living life in peace  
You may say that I’m a dreamer  
But I am not the only one  
I hope someday you’ll join us  
And the world will live as one”



public art because of its design, evoking and engaging people's minds, and its purpose. *Non-Violence* expresses an idea, provokes a reaction, and promotes reflection and debate. Moreover, this specific sculpture and public art evokes the meaning of peace and it could be a great memorial for John Lennon whose songs and lyrics mostly advocated peace and non-violence. The UN Secretary-General and Nobel Peace Laureate stated:

The sculpture *Non-Violence* has not only endowed the United Nations with a cherished work of art; it has enriched the consciousness of humanity with a powerful symbol that encapsulates, in a few simple curves, the greatest prayer of man; that which asks not for victory, but for peace (Cespedes, 2016, p. 114).

Another example is *The Freedom Sculpture* or *Freedom* which is executed by Zenos Frudakis <sup>16</sup>in downtown Philadelphia, Pennsylvania, USA (Figure 1-18). This sculpture can also be considered as public art because of its design, the space that it creates, and the idea and purpose behind it. The *Freedom* sculpture's design quickly evokes the theme of freedom. The artist stated:

I wanted to create a sculpture almost anyone, regardless of their background, could look at and instantly recognize that it is about the idea of struggling to break free. This sculpture is about the struggle for achievement of freedom through the creative process (Frudakis, n.d.).

Moreover, the public interacts with this sculpture and public art, not just intellectually and emotionally but physically. This sculpture is built in a way that people can place themselves inside the sculpture and become part of the composition (Frudakis, n.d.).

---

<sup>16</sup> Zenos Frudakis (born July 7, 1951) is an American sculptor whose work are included monuments, memorials, portrait busts and sculptures of living and historical figures, military subjects, sports figures, and animal sculpture.





Figure 1-17. *Non-Violence (The Knotted Gun)*. Carl Fredrik Reuterswärd. United Nations headquarters in New York, USA. Completion date 1985. © dailyphotostream.blogspot.com.

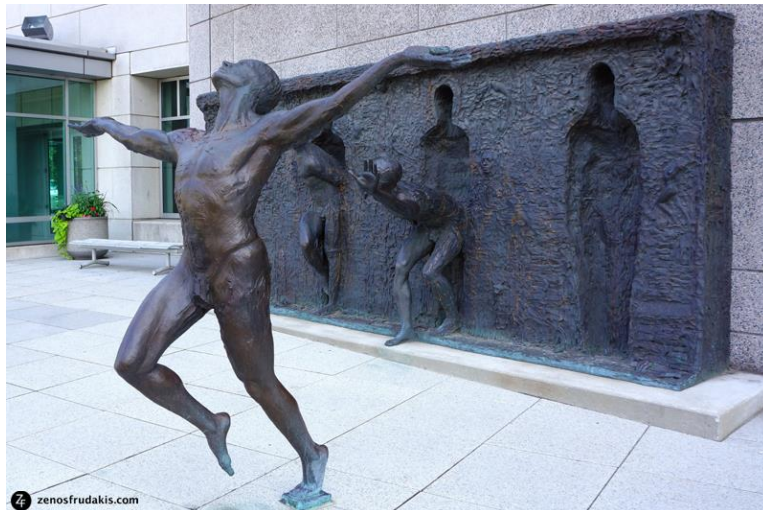


Figure 1-18. *The Freedom Sculpture or Freedom*. Zenos Frudakis in downtown Philadelphia, Pennsylvania, USA. 2001. © 2015-2020. FRUDAKIS STUDIO

Sometimes people destroy or break a statue or an artwork that once was a symbol of power or ideology. This may happen in societies where people have not yet fully understood the meaning of democracy. For example, the statue of *Reza Shah*<sup>17</sup> *Boots* (Figure 1-19) in Sa'dabad palace Complex in Tehran, Iran which was a part of a full-length statue of Reza Shah in military uniform was broken by the revolutionaries during the Iranian Revolution in 1979

---

<sup>17</sup> From 15 December 1925, Reza Shah (King Reza Pahlavi) was Iran's Shah (King) until he was forced to abdicate on 16 September 1941 by the Anglo-Soviet invasion of Iran.

in Ahwaz. The statue of Reza Shah boots is the only remaining sculpture of the Pahlavi era, therefore, its remains were preserved and moved to the Sa'd Abad Palace Museum Collection (Iranian Students' News Agency, 2015). This sculpture is not public art, but it can be considered as a sculpture in public space.

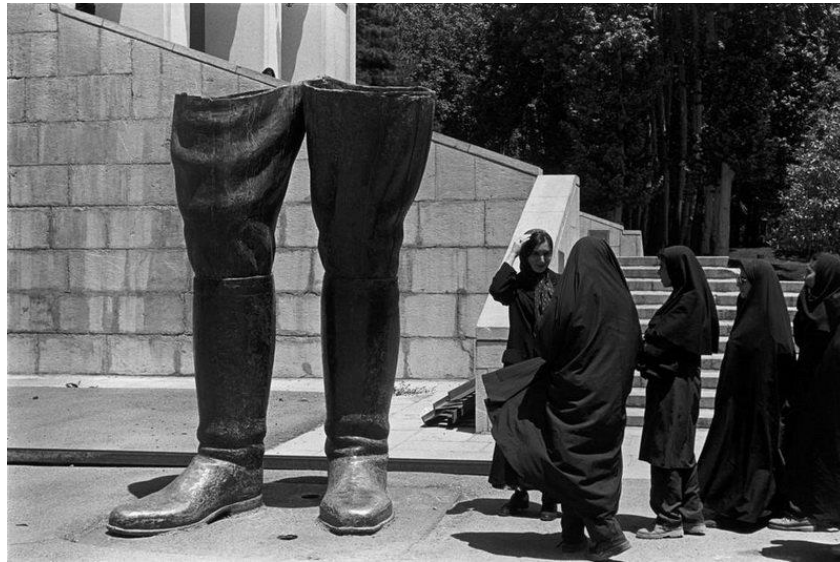


Figure 1-19. *Reza Shah Boots*. Unknown artist. Sa'dabad palace Complex in Tehran, Iran. (n.d.)  
©Abbas Attar.

Politicians sometimes use art to make soft changes in society for the benefit of their own policies. For example, Moscow metro built under the command of Stalin has bas-reliefs, friezes, marble and bronze statues, stained-glass windows and countless mosaics made with glass, marble, and granite in a good Byzantine fashion which are representing former revolutionary and historical figures, their victories, sports, industry, agriculture, and war, as well as common Soviet people like workers, soldiers, farmers, and students (Kaushik, n.d.). After Stalin's death in 1953, the process of *Destalinization*<sup>18</sup> started and Stalin's images were gradually withdrawn from the Moscow metro. Therefore, sculptures, mosaics, and reliefs with Stalin's images were removed or taken to the storage (Figure 1-20) (Kaushik, n.d.). New stations were changed architectural designs and were avoided by stucco works and images with Stalin's theories (Kaushik, n.d.). However, today there are still artworks with the image

---

<sup>18</sup> **Destalinization** is the policy of eradicating the memory or influence of Joseph Stalin and Stalinism (Oxford American dictionary).

of Lenin at Moscow metro stations. Changes in Moscow Metro's architecture and designs during and after Stalin's leadership is an example of using art from politicians to make soft social changes to the advantage of politics. Hitler regime and Nazi government in Germany from the 1920s until 1940 censored and banned the *Degenerate art*<sup>19</sup> that was not followed its fascistic taste, while admired traditional paintings and sculptures that exalted the values of racial purity, militarism, and obedience of 'blood and soil' (Farago, 2014). These two aforementioned examples of using art in public spaces in the benefit of political trends proved the power of art in influencing people's minds and behavior.



Figure 1-20. The image of Stalin was on the banner in the opening day of the station in 1950, but it was replaced with the image of Yuri Gagarin in 1961 (Guzeva, 2019).

Obviously, public art can be used as a tool for manipulating people's minds, in order to consolidate the power of politicians and authorities, which most of the time accompanies censorship of artwork toward safe and uncontroversial art (Hall, & Robertson, 2001). For example, the sculpture 'Fist and Rose' (*Neve Og Rose*), in Oslo is a symbol of the Social Democratic movement (Figure 1-21). It is installed in front of the trade union's headquarters with 4.8 meters high, the rose is made of steel and the hand is made of bronze. To install this

---

<sup>19</sup> **Degenerate art** (in German: entartete Kunst) is a term that was common in Nazi government in Germany. The goal was to reject the works of Jewish artists and opponents of the Nazi government, such as Beckman, Chagall, Kandinsky, Kelle, Kokoschka, Nolde, Gross and others. Degenerate Art was also the title of an exhibition held by the Nazis in Munich in 1937 consisting of 650 modernist artworks, along with text labels deriding the art.

artwork, there were some difficulties. The authority of Oslo (who asked the artist to design and create the work) didn't accept the artwork when they saw the cast, because they considered it too political! Afterward, by the insist of the artist and by the support of Trade Union for Metalworkers (which celebrated their 100 years' anniversary), the Oslo city council agreed to install the work in the city (Coronare Modestus Faust, 2011).

This public art is a significant statue that tends to evoke an egalitarian democratic society. It reminds people they must be strong and powerful, while nothing valuable can be obtained without effort and endurance. The rose thorns and the hand that split the earth with power are symbols of hardness and endurance on the road to democracy. It provokes people to be consistent in their fighting in a non-violent way to achieve justice.



Figure 1-21. *Ola Enstad*. *Fist and Rose (Neve Og Rose)*. Lille Torvet, Oslo, Norway. 1990.

Public art provides visual attractiveness of the city and at the same time has the ability to aestheticize urban spaces. In addition, through public art, authorities can demonstrate their desire to deal with social and environmental problems (Sharp et al, 2005). Public art is usually ordered or obtained with the permission and cooperation of the government or the company that owns or manages the space

#### 1.6.4 Economic Scopes

There are governments (such as United States, Canada, European countries like Finland, Ireland, Great Britain, France, Norway, and Sweden) which have the policy *Percent-for-art* to assign one to two percent of the total cost of any newly constructed project to create common art projects (Hamilton, Forsyth, De longh, 2001) (Pulkkinen, & Hannus, 2005). This policy helps to promote art and artistic project besides an increase in the requests for the art project and creates a turnover in the art market. The amount of money that allocates in this market will be very different from one place to place.

According to Henry Lydiate who described the artist benefits and the public benefits from the policy of Percent-for-art:

“Artists benefit from:

1. Recognition through public commissions and purchases;
2. Gainful employment;
3. Training and experience of monumental or public artworks;
4. New and large-scale creative opportunities, particularly in relation to the provision of new services in urban planning, architecture, construction, landscaping, and interior design;
5. Relief from unemployment.

The Public benefits from:

1. Enhancement of their opportunities to appreciate public places;
2. Demystification of the fine arts by their manifestation in public places;
3. Acquaintance with the works of artists of their time;
4. Improvement of the environment, particularly for public employees working in public buildings which may be made more inviting to the public;
5. Accepting responsibility for artists and craftsmen;
6. Providing a medium for expression by the community in relation to its own identity;
7. Enhancing the community’s reputation and standing as a leader in public arts;



8. Providing a reason for civic pride;
9. Raising the morale of the public and public workers, thereby increasing efficiency;
10. Making people happy and educating them through their environment;
11. Enhancing the architectural environment;
12. Fostering, promoting and their artistic heritage” (Lydiate, n.d.),

*Going Away, Coming Home* is an architectural public glass art project for Oakland International Airport which is done with the budget of \$300,000 under Percent-for-art policy for its funding (“Americans for the arts”, n.d.) (Figure 1-22). This artwork is done by *Hung Liu*, commissioned by Oakland International airport and the Oakland Museum of California (“Americans for the arts”, n.d.). (See chapter 2, section 2-2).

Delivering an artwork in a public place requires a collaboration of different organizations such as: “the city authority, developers and landowners, regeneration partnerships, the citizen themselves, founding and commissioning bodies, artists and artistic producers” (Brown, 2005, p 36).

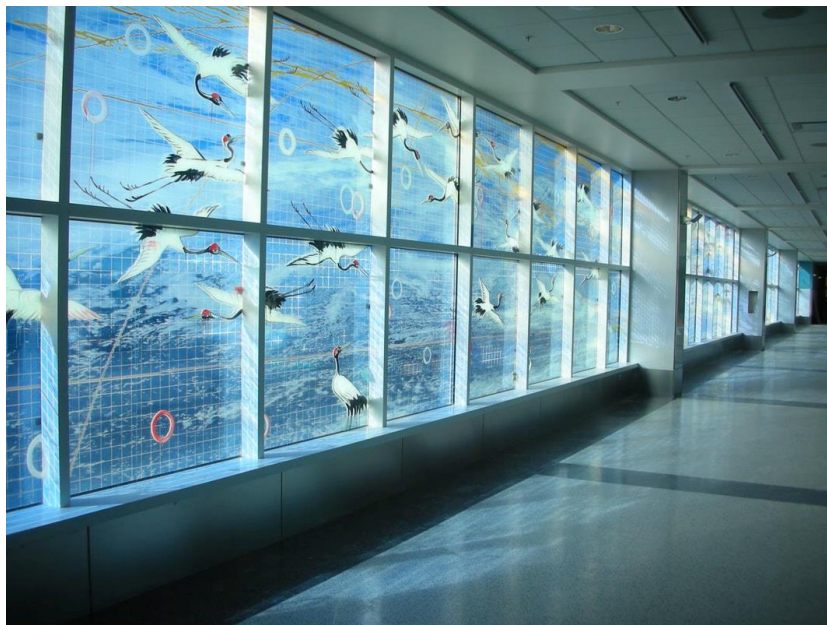


Figure 1-22. *Going Away, Coming Home*. Hung Liu. Oakland International Airport, Terminal 2 Window Project, 10' x 160', Oakland, California, USA. 2006. ©Hung Liu 2016.

In a city when installing a public art piece, expert committees of the municipality discuss and decide what kind of art (in terms of scale, shape, creator/artist, process/material) would be suitable for the specific audience, place, and the spirit of society and art world (Zebracki 2014). According to Zebracki (2014, p. 7) there are various factors that usually the expert committees of the municipality consider for choosing a proper public art for a specific place such as:

- If it is “permanent vs. temporary public art (i.e. public art all year round vs. seasonal art);
- top-down commissioned public art vs. underground art such as graffiti;
- artist-in-residence schemes vs. off-site artistic production;
- site-specific vs. generic (or sterile) public art;
- figurative vs. abstract appearances;
- decorative vs. interactive work;
- art for central public city spaces vs. neighborhood art in the ‘peripheral’ outskirts” (Zebracki 2014, p 7).

The decisions and approach of the municipality have an important impact on the physical change of the metropolitan area, including the downtown of the city and harbor, as well as strengthening its economic competitiveness, especially in a tourist and the convention center. Its achievements will also be accompanied by increased social polarity and an increase in the quality of everyday life. One of the cultural strategies for cultural-led regeneration is ‘*Place Branding*’ and ‘*Place Marketing*’. Pamela J. Landi in her MA thesis (2012, p. 31) described that the idea of place branding is important as a part of policy-making that aims to define public perception, and, because of an apparent connection between the service of public art to city image. She also explained that in ‘place branding’, public art could situate both as an object and symbol.

For example, before the opening of the Guggenheim museum (Figure 1-23) in 1997, Bilbao was a small city that was not a tourist destination. As Terence Riley, the director of Miami Art Museum at the Museum of Modern Art in New York said: “No one had heard of Bilbao or knew where it was. Nobody knew how to spell it since the Guggenheim changed that

overnight” (Lee, 2007). Although the Guggenheim is an art museum and is not a public art piece, its architecture can be considered as a public art object, in addition to its value for inside artworks. Guggenheim museum architecture is built in a way that has all the features of a public art object such as accessibility for all the citizens in a public space, site-specificity, creating identity and history, provoking people’s imagination, and at the end, its scale and design is odd and eye-catcher. It played an important role in the brandization<sup>20</sup> of Bilbao city, which had a significant impact on attracting visitors and tourists (Quintas, 2015). Juan Ignacio Vidarte, the Guggenheim’s director stated by the end of 2006, around nine million visitors had paid homage to the museum (Lee, 2007). This quantity of visitors for Guggenheim revitalized the city economy, changed the small City of Bilbao to a city with hotel clerks, art collectors, and skylines of known architects such as Alvaro Siza (University building), Cesar Pelli (40-story office tower), Zaha Hadid (master plan) and many others (Lee, 2007).



Figure 1-23. Guggenheim Museum (museum of modern and contemporary art). Frank Gehry (architect). Bilbao, Spain. Inaugurated on 18 October 1997. ©Denis Doyle for The New York Times.

---

<sup>20</sup> The brandization concept is related to the city as a consumer brand, salable as any other product through specific marketing integrated into a coordinated business strategy (Quintas, 2015).



## Chapter 2: Glass Art in Public Spaces

### 2.1 Divisions of Glass Art in Public Spaces in The Contemporary Urban Context

In chapter one, public art is defined, and the social, cultural, political, and economic issues are explained. In this chapter we will address Glass art in public spaces, that could be seen in architecture, the entrance of buildings and shopping centers, sculptures, art installations, billboards, monuments, and memorial installations. However, all the glass art pieces displayed in public spaces cannot be considered as public glass art. The term '*Public glass art*' in this research is referred to as public arts which are created substantially or wholly made of glass, or glass is used in some parts of it as a significant material. This research also intends to investigate public glass art in a contemporary urban context that means the current and recent state of public art which is executed with glass in urban public spaces. To understand what public glass art is, it must first be perceived whether the glass artwork in public space can be considered as a public art object. With regards to public art features<sup>21</sup>, if a glass artwork in a public space could be called public art, then it can be considered as public glass art.

To elaborate further on what public glass art is in the contemporary urban context, our research used the terminology of **glass art in public spaces** which is the glass artwork made by an artist with an **artistic intention** to communicate with the public. Therefore, in this research, glass art in public spaces can be divided into three groups: 1) Architectural glass art, 2) Sculptural glass art and Glass art installation, and 3) Public glass art.

The main focus of this research is on 'Public glass art'. Figure 2-1 demonstrates the planification of how these categories intersect with each other. As we will visualize some pieces can be integrated into all categories, or in two of them. For example, the work *Angles of Incidence* presented in Figure 2-13 can be categorized in both sculptural glass art and public glass art.

---

<sup>21</sup> Please refer to chapter 1-3.

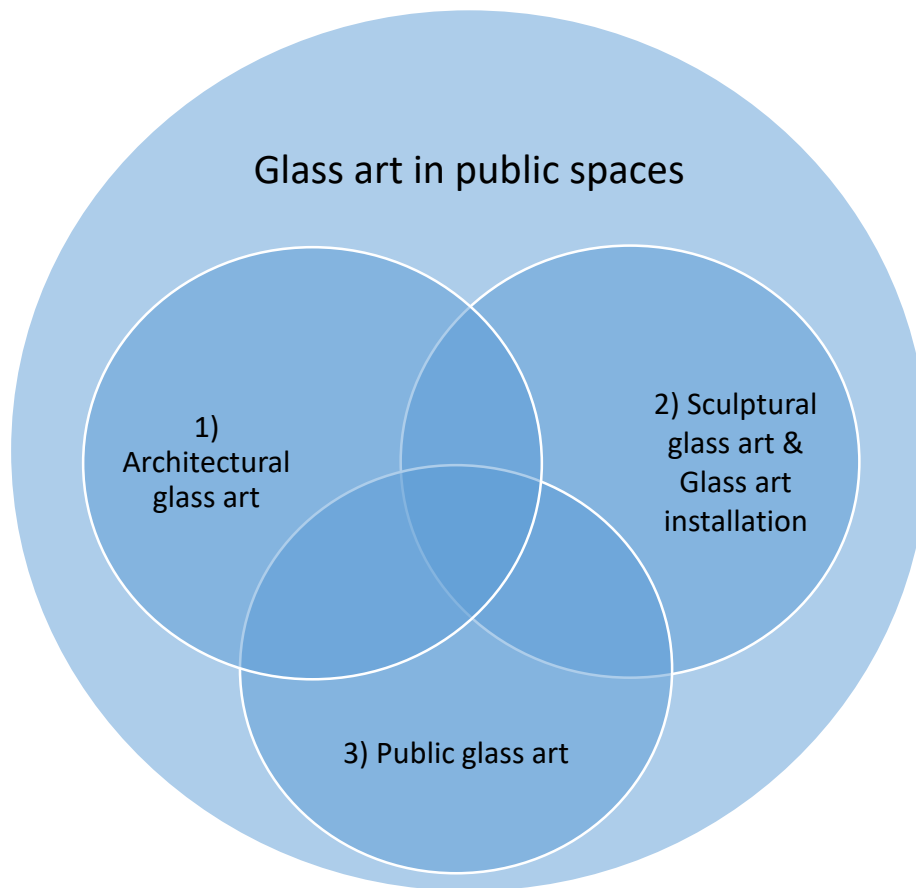


Figure 2-1. This figure represents the division of glass art in public spaces.

'Public glass art' in the contemporary urban context does not relate to glassworks such as the *Reichstag* glass dome of the German parliament in Berlin (Figure 2-2, Figure 2-3). Although this glass dome is one of the great examples of using simple glass panels (not glass artworks) in architecture to create a transparent dome, the glass panels are simple sheets and have no artistic intention when they were conceived. Therefore, in the creation of this dome, glass art is not presented, but the glass is used to design democratic forums and made the process of government publicly accessible (Foster, 2000). Norman Foster, who designed this architecture, has a close relationship with the symbolic function intended, mainly related to the architectonic design: the dome alludes symbolically to the transparency that all powers should have towards the population.



Figure 2-2. *Reichstag*, Parliament of Berlin, Germany. Rebuild between 1992 and 1999.



Figure 2-3. Inside the Reichstag dome. Designed by Norman Foster. Parliament of Berlin, Germany.  
©Foster + Partners.

### 2.1.1 Architectural Glass Art

The partnership between glass and architecture is not new. Knapp stated that since the invention of glass in pre-Roman times, glass has been used in buildings (Knapp, 1998). While based on the excavations in Tchogha Zanbil Ziggurat in Iran, glass objects were used at walls and doors (Please see chapter 3.4) around 2.500 BC (del Vallès, 2018). For thousands of years, mankind has tried to build shelter, protection, privacy and also provide illumination and view in the buildings (Wigginton, 1996). Glass in architecture has been used to let light in, keep the elements out, and also for the view of adjacent space, ventilation, philosophical and psychological uses and sometimes the glass was used to depict spiritual symbolism such as the use of glass in Gothic architecture (Knapp, 1998). In the last decade, architectural glass art was influenced and improved by the invention of the float glass process by Sir Alastair Pilkington in 1952 which produced clear, tinted, and coated glass for buildings (Pilkington, n.d.).

Cate Watkinson in her PhD thesis, defined architectural glass art:

Architectural glass can be defined as the use of decorative glass to amalgamate art and architecture, creating artworks that are integrated into the fabric of a building or the built environment. These include decorative interventions to glass facades for public buildings, stained glass windows for private residencies, or public buildings, such as hospitals or places of worship, public landmarks and street furniture (Watkinson, 2013, p 26).

However, here in this thesis architectural glass refers to the glass art pieces that are used and connected to architecture (both interior and exterior) which is accessible to the public. Architectural glass can be used in various places such as windows, ceilings, domes, floors, room dividers, doors, screens, roof extensions. Most of the architectural glass was connected with a window. Although it is becoming more common to see works that are not combined with a window, some are sculpture pieces or installation in architectural buildings (such as

the work of Cigler in Figure 2-17). Gerhard Richter, Brian Clarke<sup>22</sup>, Václav Cigler<sup>23</sup> are examples of famous artists in the creation of architectural glass art in public spaces. For instance, inside the Reichstag building, there are several artworks from different artists such as the *German flag* by Gerhard Richter which is built-in glass on a large scale and installed on the wall (Figure 2-4) (Foster, 2000). This artwork is a glass art installation in an architectural building. The German flag was made of glass to symbolize the fragility of democracy. It shows that democracy is brittle like glass material and required constant care.



Figure 2-4. *German Flag*. Gerhard Richter. Reichstag, Parliament of Berlin, Germany. 1998© (Foster, 2000, p 219).

*Spitfires* in Lexington Street, Soho, London, executed by Brian Clarke is an example of architectural glass art made with stained glass technique (Figure 2-5). This architectural glass art in Soho PACE Gallery space was commissioned for the 2016 exhibition '*Summer Solstice Spitfires*'. It can be seen by passersby at night (Figure 2-6) or within the gallery space during the day (Clarke, n.d.). Another example of architectural glass art is the *Pyramid of Peace* in Astana (Figure 2-7, Figure 2-8), Kazakhstan which was designed by Brian Clarke and architects Foster and Partners in 2005. This is a 62-meter-high glass artwork in 900 square meters in area (Clarke, n.d.). In Brian Clarke's Studio webpage, it is explained that:

---

<sup>22</sup> Please refer to subchapter 3-7-5.

<sup>23</sup> Please refer to subchapter 2-2.

The pyramid has been designed to be a global center for religious understanding, the renunciation of violence, and the promotion of faith and human equality. In keeping with these aims, Brian Clarke's apex glass depicts a flock of white doves in flight set against a background field of vivid blue and gold (Clarke, n.d.).

The fusion of this building's glass art design and architecture is a manifest to the building's intent which is a message of peace.

The move from traditional stained-glass windows of religious buildings to modern stained glass in architectural design in the twentieth century increased the wide and experimental use of other glass art techniques in architecture (Moor, 1997). Different type of glass, such as Float glass<sup>24</sup>, Flashed glass<sup>25</sup>, Cased glass<sup>26</sup>, Dichroic glass<sup>27</sup>, and several techniques like colored glass, painted or printed glass, stained glass<sup>28</sup>, tempered/toughened<sup>29</sup> glass, laminated glass<sup>30</sup>, fusing, slumping, and casting among others<sup>31</sup> can be used in architectural design. Glass facades of buildings, glass windows, and doors, and another usage of glass in architecture is considered as architectural glass, but not architectural glass art. While all the glass art designs in the entrance of buildings, glass art panels in airports and train stations, facades of buildings, and glass windows, doors, and ceilings which are created by the creative and artistic process and design could be considered as architectural glass art. For instance, the curved glass wall of *Leica Museum* in Wetzlar of Germany (Figure 2-9), or *Audincourt* (1950-52) from Fernand Léger in Audincourt Church, France, a glass window made with *Dalle de verre* technique. Other examples can be given that will be present further ahead in this thesis, such as, *Dome of light* in the central metro station of Kaohsiung city in Taiwan (Figure

---

<sup>24</sup> Float glass is a flat polished transparent glass made by allowing the molten glass to harden as it floats on a liquid of higher density.

<sup>25</sup> When a very thin layer of colored or opal glass covers a layer of contrasting color, it is called flashed (Pfaender, 2012). "This is achieved by dipping a gather of hot glass into a crucible containing hot glass of the second color. The upper layer may be too thin to be worked in relief. After the piece is dipped in the glass of a contrasting color, it is blown to final form" (Pattern glass school, n.d.).

<sup>26</sup> "A technique of putting successive layers of different colors of glass over an object. Sometimes cased glass is cut away to expose the layers of color. The term plating as a synonym for casing appears to be in North American term. The term 'cased' is mostly using in Europe" (Pattern glass school, n.d.).

<sup>27</sup> Please refer to subchapter 2.4.1.

<sup>28</sup> Please refer to subchapter 2.3.1.

<sup>29</sup> Please refer to subchapter 2.3.5.

<sup>30</sup> Please refer to subchapter 2.3.5.

<sup>31</sup> Please refer to subchapter 2.3.14.



2-20), glass art panels in the arrival and departure hall of 'International Airport of Hong Kong' (Figure 2-42, Figure 2-43), Wind tower Regent College in Vancouver, Canada (Figure 2-87) are architectural glass art in public spaces . There are many examples of architectural glass art around the world executed by different artists and different companies. *Proto Glass Studio*<sup>32</sup> and *Andrew Moor association*<sup>33</sup> in the UK, *Derix Glasstudio*<sup>34</sup>, and Lamberts Glass in Germany are just examples of companies that execute and create architectural glass art in the commercial, public and private sectors in Europe<sup>35</sup>.



Figure 2-5. Lexington Street Spitfires. Brian Clarke. View from inside of the Soho PACE Gallery. Soho, London, UK. 2016. ©Parinaz Faghihi-2017



Figure 2-6. Street view of Lexington Street Spitfires. Brian Clarke. Soho, London, UK. 2016. ©Brian Clarke.

<sup>32</sup> **Proto Glass Studio** is a decorative architectural glass manufacturers of specialist glass product. They create decorative glass to the highest standards for use in the commercial, public and private sector. (<https://protoglasstudios.com/>)

<sup>33</sup> Andrew Moor founded **Andrew Moor Associates** in 1984 to assist architects in managing glass art projects ([www.Andrew Moor.co.uk](http://www.AndrewMoor.co.uk)).

<sup>34</sup> **Derix Glasstudio** founded 1866 in Germany, specialized in executing artistic and/or architectural designs in architectural art glass. Their services include, but are not limited to, initial consulting, project development, planning and construction, architectural glass art project management and manufacturing ([www.derix.com](http://www.derix.com)).

<sup>35</sup> There are more examples of companies creating architectural glass art or getting artists ' orders to make possible the creative ideas of artists about public glass art.



Figure 2-7. *Pyramid in Peace*. Brian Clarke. Astana, Kazakhstan. 2005. ©2013-2020 Brian Clarke.



Figure 2-8. Inside the *Pyramid in Peace*. Brian Clarke. Astana, Kazakhstan. 2005. ©2013-2020 Brian Clarke.



Figure 2-9. *Leica Museum*. Alt Alfons. Wetzlar, Germany. 2013? ©LambertsGlass.



### 2.1.2 Sculptural Glass Art and Glass Art Installation

Sculptural glass art in public spaces refers to the glass-built sculptures or installations that are installed in public or collective<sup>36</sup> spaces. Although sculptural glass art is not the same as glass art installations, they can be placed in the same category. Installations can be temporary and under some restrictions and are displayed in a specific place for a period of time; installation focuses more on the use of arrangements, space, and surrounding environment within the artwork. Sculptures focus on the viewer's interpretation while observing the sculpture itself (Saake, 2009). Besides, the main difference between installation and sculpture is that installations are generally designed and fabricated for a particular location. They focus more on the arrangement use of space and the environment within the artwork, artwork is seen as a whole together with the site the work is set in. In contrast, sculptures usually focus on the main subject and interpretation of the viewers while looking at the sculpture itself. Thus, sculptures are not always site-specific. They are not usually seen with the environment as a whole. The best example of this kind is the glass art installations by Dale Chihuly (please refer to chapter 4.2.2) in a wide variety of settings, from public spaces and museums to private homes and botanic gardens (Figure 2-10, Figure 2-11). *Ethereal White Persian Pond* and *Foot Boat* cannot be considered as public glass art category, they are just glass art installations in public/semi-public or semi-private spaces because they are not accessible to everyone, and those who want to see these artworks need to purchase a ticket, so they can enter in the botanical gardens, museums or semi-public institutions.

Another example of a glass art installation is *Peephole* (Figure 2-12) that the artist Jan Ambruz created. According to Raimanová on the Agosto Foundation webpage:

The installation is part of a larger series of installations in both interior and landscape, dated between the 80s and 90s, where suspended glass plates were used. Unique is Ambruz's technology of making the large shapes and plates of window glass 'levitate' on ropes, all by using very simple tools and materials to

---

<sup>36</sup> Collective spaces are explained in chapter 1-2.

get an effect of mirroring the space and daylight on the sculpture's surface (Raimanová, 2018).

The *Peephole* is a glass installation that is done by 50 glass plates, rope, iron hooks, light, and space (Raimanová, 2018). Space is an essential item here that the installation has no meaning without it. The *Peephole* is a glass art installation, but it cannot be considered as a public glass art because it is not in public space or openly accessible to the public.



Figure 2-10. *Ethereal White Persian Pond* (detail), 2018. Dale Chihuly. Royal Botanic Gardens, Kew, London, installed in 2019. ©2019 Chihuly, Inc.



Figure 2-11. *Foat Boat*, 2008, *The Sun*, 2003, and *Red Reeds*, 2009. Dale Chihuly. Salk Institute for Biological Studies, La Jolla, California, installed in 2010. ©2019 Chihuly, Inc.



Figure 2-12. *Peephole (for J. K.)*. Jan Ambrůz. Granary (1994). Dimensions: 180×180×1400cm ©Photographer: Daniel Šperl. Agosto Foundation.

*Angles of Incidence* (Figure 2-13) in Victoria Cross, North Sydney which is created by Warren Langley and Julia Davis in 2016 is an example of sculptural glass art that can be considered as public glass art. It is a five-meter sculpture that Julia Davis stated: “The dialogue between the sculpture and its surroundings is a metaphor for the ‘interactions’ that have happened on this site from its pre-colonial past to the commercial and entertainment precinct it is now” while Langley added: “To embed the concept with a sense of site-specificity the form has been loosely based upon a small quartz grain from the underlying sandstone of the area” (Archello, n.d.).

*LightMan Number1* (Figure 2-19) by Joost Van Santen in Wenceslas Square in Prague, sculptural glass art by Ed Carpenter in Figure 2-79, Figure 2-80, Figure 2-81 and statue of the *Archangel Michael* by Herman Lamers in the municipality of Zwolle (Figure 4-16) in the Netherlands are also other examples of sculptural glass art.



Figure 2-13. *Angles of Incidence*. Warren Langley and Julia Davis. Sydney, Australia. 2016. © Photo credit: Richard Glover.

### 2.1.3 Public Glass Art

Public glass art refers to public art pieces that are executed with glass as a significant material. At the same time, it has all characteristics of a public art piece such as accessibility for all in a public space, provoking debates, engaging people, gives or creates identity and history to the public space<sup>37</sup>.

There are some sculptural glass art, glass art installation, and architectural glass art that can be considered as public glass art pieces depending on the place of installation, features, and design of the artwork. For example, *Prismatica* in Montreal Canada (Figure 2-78) is a glass art installation and at the same time public glass art (that will be presented later in this chapter).

Another example of sculptural glass art and public glass art is *Vision of Color* in Oklahoma Eye Institute (Figure 2-14) which is a collaboration between architect Mark Dziewulski with Chinese-American visual artist Shan Shan Sheng<sup>38</sup>. This public glass art is a public art piece because of its features, site-specificity, accessibility to everyone that creates an identity for the place and engages people's minds and imaginations.



Figure 2-14. *Vision of Color*. Mark Dziewulski and Shan Shan Sheng. Oklahoma, USA. 2008. 10 x 20 x 8 ft ©Shan Shan Sheng.

---

<sup>37</sup> The features of public art is mentioned in chapter 1.3.

<sup>38</sup> Their proposal won for a public art call in 2008 to be installed outside the new Dean McGee Eye Institute (DMEI) in Oklahoma City in USA (KTMO5678, 2011).



*Crown Fountain* (Figure 2-15) and *Ascent at tower Square* (Figure 2-16) could be great examples of public glass art that have all the features of this category as they are public art projects and created with glass.



Figure 2-15. *Crown Fountain*. Jaume Plensa. Millennium Park, Chicago, USA. 2004. Made of glass bricks. © Copyright 2020 Jaume Plensa.

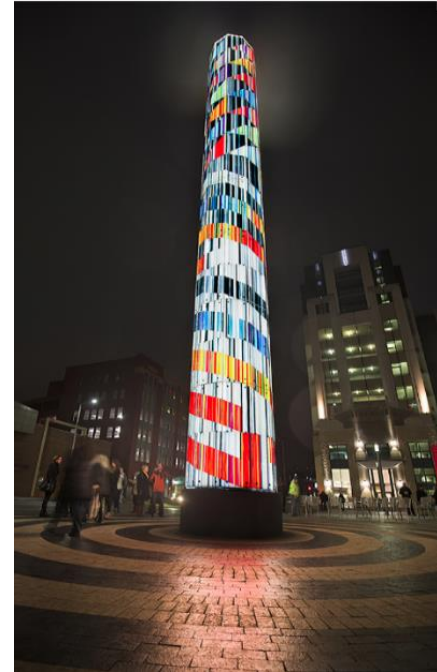


Figure 2-16 *Ascent at Tower Square*. Jun Kaneko. Lincoln, Nebraska. 2014. ©Jun Kaneko.

In the last 40 decades, public art has improved, while policymakers, municipalities, and artists have paid more attention to better city marketing, urban and cultural regeneration, and pedagogical purposes. After the ascending order of importance on public art, artists try to broaden their creative imagination on the usage of the material for their artworks. The art society was brave enough to bring creative artworks with glass, which is a fragile and delicate material (in the public's mind) in public spaces. As mentioned in chapter 1, the public art approach has changed after 1980. Earlier, it was not accepted to use other material than stone, wood, concrete, and metal for the creation of public art pieces, and the usage of glass in public spaces was limited to architectural design such as stained glass mostly in churches, and tiffany glasses for decorative designs. Just as Ricke Helmut says about new glass in

Europe: “A profusion of adequate technical design-possibilities had to be developed for the abundance of new conceptual beginnings” (Ricke, 1990, p 13). With the development of new technical possibilities, including ‘smart materials’<sup>39</sup> resistant to different environments, the more opportunities we create for different and amazing designs in public art. As much as public art gets importance, the innovative materials and techniques used to present artworks in public spaces become more important.

Artists with their entrepreneurial actions create places with their expressions that are ‘the expressible expressed’ (Cauquelin, 2005). To create public glass art, an artist needs to have experience and knowledge of material, history, and aesthetics. These three areas of understanding are essential for who wants to create an artwork with glass as Keith Cummings (1997) argued:

A full understanding of the history and properties of glass can demonstrate, for example, that the particular property of liquid glass that causes it to create a skin at its junction with air, lies behind many standard glass-making procedures, from tube-drawing and sheet-rolling to blowing itself. ... An understanding of material other than glass can lead to a widening of the framework within which mutually beneficial cross-reference can take place. Equally, an involvement with creative philosophies and general formal language in their widest sense as part of me in stream art and design can all help to prevent glass-art and glass-craft from becoming mere sluggish, self-referential tributaries of that mainstream (p. 9).

It is also essential to have enough knowledge of place-making, the ability to team-working, and investigating all geographic aspects of the place (where the artwork is to be installed)

---

<sup>39</sup> “Smart materials are relatively new term for materials and products that have changeable properties and are able to reversibly change their shape or color in response to physical and/or chemical influence, e.g. light, temperature, or the application of an electric field” (Ritter, 2006, p 8).

such as Physical geography<sup>40</sup>, Human geography<sup>41</sup>, Cultural Geography<sup>42</sup>, Political Geography<sup>43</sup>, Environment geography<sup>44</sup>.

Creating and installing a public glass art requires a different range and a vast amount of knowledge and information from arts to science, technology to politics, culture to the economy, and sociology to geography and environment. This amount of work and knowledge requires team working and a manager to attain the primary goal of a group who works on a public glass art project.

## **2.2. The Capacity of Glass as a Versatile Material**

In this section, to answer what public glass art is, glass art in public spaces is divided into three divisions. Each division is explained and exemplified. The capacity of glass for the creation of an artwork to be installed in public spaces is studied. The questions of why artists use glass and what techniques have been used for the creation of glass art pieces in public spaces will be answered.

The morphology of glass is extraordinary and was also unique until the development of plastic in the 19<sup>th</sup> century (Cummings, 1997). It is an interesting material that has great metaphysical potential. Transparency, translucence, and brightness have presented glass as a versatile material that can be shaped in cold, warm, and molten states through different techniques (Almeida, 2011). It can be blown, cast in any shape, rolled, spun, and given any color, texture, and pattern, while glass gets cold, it can be painted, engraved, etched, polished, beveled, chipped, or cut in any shapes or sizes (with hand or laser-jet-cut machines) (Vogel & Achilles 1993).

---

<sup>40</sup> Dealing with natural features.

<sup>41</sup> Human geography or anthropogeography is the branch of geography that deals with the study of people and their communities, cultures, economies, and interactions with the environment by studying their relations with and across space and place (Gregory, Johnston, Pratt, Watts, & Whatmore, 2011).

<sup>42</sup> Cultural geography is the study of the many cultural aspects found throughout the world and how they relate to the spaces and places where they originate and then travel as people continually move across various areas (Briney, 2019).

<sup>43</sup> Deals with the boundaries, divisions, and possessions of states (Oxford American dictionary).

<sup>44</sup> Is related with the study of the Earth, its land and other physical features, environment and its relationship to human life.

One of the most effective things that happened in the improvement of contemporary glass art to be a versatile material was the 'Studio glass movement' in the USA. The studio glass movement was born in 1962 in a garage of the museum ground of Toledo when Harvey Littleton<sup>45</sup> with the help of Dominick Labino<sup>46</sup> built the first mobile furnace for three days of demonstration of the glass craft. They built a small, inexpensive furnace in which glass could be melted and worked, making it possible for artists to blow glass in independent studios for the first time (Corning Museum of Glass, 2011). The Studio Glass Movement was a movement that intended to enable artists, particularly those working with ceramics, to use glass in an equally plastic way (Layton, 1996). This movement was created based on the invention of studio furnaces, which made it possible to create glass art pieces out of factories that either enable artists to share their technical knowledge and ideas. The studio glass movement spread to Europe, the United Kingdom, Australia, and more recently, Asia (Corning Museum of Glass, 2011). For example, Sybren Valkema<sup>47</sup> saw the blowing demonstration of Harvey Littleton and Dominick Labino together and their small portable gas-fired furnace in a meeting in New York<sup>48</sup> (Eliën, & Prisse, 2009). Then later in 1965, Valkema returned to the Netherlands and with the help of specialists from Leerdam glassworkers, the influence of the studio glass movement and Bauhaus, the first mobile furnace in art schools in Europe constructed and the

---

<sup>45</sup> "Harvey Littleton, a teaching ceramist at the University of Wisconsin in Madison, who became inspired by the pioneering work in ceramics of the California potter Peter Voulkos. Informed by his own background in the material, Littleton started experimenting with hot glass in his studio in 1958. He eventually realized that his desire to develop studio glassblowing in America could become a reality after encountering the small, historic glasshouses of Italy and experiencing limited success with his own glassblowing experiments.... Littleton joined forces with the Toledo Museum of Art, the site of the "birth" of the American Studio Glass movement during two historic glassblowing workshops in March and June of 1962" (Corning Museum of Glass, 2011).

<sup>46</sup> "Dominick Labino (1910-1987) was an internationally known scientist, inventor, artist and master craftsman in glass. He designed glass-blowing and finishing tools; built his own furnaces and annealing ovens; and began freehand blowing with molten glass" (The kings fortune, n.d.).

<sup>47</sup> Sybren Valkema, Dutch artist who was teaching aesthetics design during 1943-1953 at Leerdam glass school as a highly valued professor. He was also responsible to build new premises for Gerrit Rietveld Academy. He played a decisive role in turning modern Dutch glass into an independent discipline. In 1964, Sybren Valkema traveled with the Leerdam designer Willem Heesen (1925-2007) to attend a meeting in New York on behalf of the Dutch Applied Arts Federation to later establish the World Crafts Council (Eliëns et al. 2009, 15-25).

<sup>48</sup> In 1964, he traveled with the Leerdam designer Willem Heesen (1925-2007) to attend a meeting in New York on behalf of the Dutch Applied Arts Federation to later establish the World Crafts Council (Eliëns et al. 2009, 15-25) It was a turning point in Valkema's career to see the blowing demonstration of Harvey Littleton and Dominick Labino together and their small portable gas-fired furnace. It leads Valkema to see the potential of Littleton's furnaces not only for him but also for his students.



first glass department in Europe, Amsterdam's Gerrit Rietveld Academy<sup>49</sup> established (Eliëns et al. 2009). Gerrit Rietveld Academy had an important role in the improvement of glass art in Europe as some important glass artists, who are educated there, and created public glass art such as Asa Brandt<sup>50</sup>, and Joost van Santen.

The studio glass movement influenced artists who later improved glass art in public spaces. For example, Dale Chihuly was Harvey Littleton's student (Lynn, 2004).

The multiple functions and the variant techniques to use glass in creating artworks have attracted artists to glass. Some artists work with glass in the majority of their pieces that consider themselves as 'glass artists', others who are not specifically 'glass artist', create artworks with several materials that sometimes include glass. The latter group of artists uses glass in their artistic creations because of the glass features. Jeffrey Sarmiento<sup>51</sup> stated: "it is possible to work in a glass but not with glass" (Sarmiento, personal communication, 22 June, 2020). This means that some artists are thinking through the glass as a concept as opposed to the material but not necessarily creating the glass art pieces. So, they don't think just about the form and color of the glass but think about the context and the glass features.

The glass shows distinctive features for creating artworks. One is the interaction of glass and light, creating dynamic images that appear and change continuously depending on the weather and the position of the light. The dynamic reflections of lights and shadows create a perceptual illusion. Stained glass windows are excellent examples of the early use of glass, color, and light. For instance, Jin Hongo is not a glass artist but uses glass as a medium because of the glass illusionistic. He stated that "... reflections are also happening in your mind, that is

---

<sup>49</sup> In August 1966, the school changed its name to Gerrit Rietveld Academy when a small furnace was installed in the new open-fronted studio. The glass department of Amsterdam's Gerrit Rietveld Academy exists for more than 50 years. It is one of the world's leading glass schools that has educated many national and international graduates in glass art (Eliëns et al. 2009, 15-25).

<sup>50</sup> Asa Brandt (1940) is a Swedish glass artist who studied in Stockholm from 1962-67. She came to Gerrit Rietveld academy in 1966 for four weeks and became the first student at the Rietveld's glass section. Then she went to the Royal college of Art in London to complete her education. In 1968, she went back to Sweden and became the first European glass artist to set up an independent glass studio. She had the opportunity to visit Sybren Valkema in the new Gerrit Rietveld academy that had just opened in November 1966. Sybren gave her the scale of furnace built in 1964 and she drew a Logo model of the furnace, which enabled her to get a local mason in Torshalla to construct the first furnace in the 15th of March 1968. Now she works and lives in Torshalla, Sweden and she has executed several public glass arts such as in Kitayama Children Daycare Center Tokyo (1996) and Arlanda Airport (1990) (Brandt, 2008) (Eliëns et al. 2009, p 9).

<sup>51</sup> Jeffrey Sarmiento (Chicago, IL, 1974) is a glass artist and Senior Lecturer in the School of Art and Design at The Australian National University. He was previously Associate Professor in Glass at the University of Sunderland, where he completed a PhD in 2011.

to say, that your experiences and knowledge you have had are reflected in yourself in your thoughts, judgments, and philosophy. In that sense, we are the illusion of ourselves” (Küçükbiçmen, 2017, p. 61).

Colors in glass are another feature that persuades the artist to create artworks with this material; as Kate Baden Fuller says, “colors in glass behave differently from colors in any other medium; it is this intensity of colors that makes glass such an intriguing medium” (Fuller, 2006, p. 5).

Andrew Moor explains three reasons for using the glass as a medium for his public art project “1- It is kinetic; it will change with the weather, the seasons, and the light. 2- It can be monolithic, standing alone; or it can be integrated into the architecture, either as cladding, glazing, balconies, canopies, etc. 3- It can also be made to light up, so the work contributes during day and night.” (Moor, personal communication, 12 August, 2016).

Václav Cigler<sup>52</sup> is one of today's leading glass artists. His advances in using optical glass have expanded the possibilities for the glass medium and make him a master of the Czech glass movement for over 40 years. His work focuses on the most critical forms-circles, spheres, cylinders, rectangular elements-in which brilliant reflections and light refractions play on and through the pieces (Art Alliance for Contemporary Glass, n.d.). He made a statement on the reasons for choosing a glass to work with since the 1950s:

I was fascinated by the light and color properties of glass.... Glass is a magic material, and in a certain sense a spiritual one. Glass is at once tangible and intangible. Like man, it is both material and spiritual. It has mass and yet it defies mass. Pure like water, transparent like air, it is thought and reality bringing into doubt our sensorial experience and at the same time enriching it with a new understanding. Glass is a box, an envelope, a tool, a mediator, a memory.... Glass is the most imaginative material that man has ever created. The presence of glass

---

<sup>52</sup> Václav Cigler was born in Vsetín in 1929 and established the Glass and Architecture Department at Bratislava Academy of arts in 1965 (Balgavá & Eliens, 2005). “A master of the Czech glass movement for over 40 years, his innovations using optical glass have transformed the possibilities for the glass medium. His work focuses on the most essential forms - circles, spheres, cylinders, rectangular elements - in which brilliant reflections and refractions of light play on and through the pieces” (Art Alliance for Contemporary Glass, n.d.).

in human space conditions not only space itself but also as the user. Glass is for me a pretext for expressing a different spatial and emotional perception of the world. A perception made unique by the optical means offered by this material, as well as by the new possibilities for using it in space... in glass, there's the authenticity of the material, the discovery that it has uncommon optical and material properties, such as malleability. Glass by itself is a sufficient source of inspiration (Art Alliance for Contemporary Glass, n.d.).



Figure 2-17. Entrance of the Gebouw Delftse Poort administrative Nationale-Nederlanden building. Václav Cigler. Rotterdam, Netherland. 1992.

Cigler's statement deals with many aspects and capabilities of glass. His contribution to public glass pieces in architecture has a great value. In 1992 he created a glass art piece for the entrance of the Gebouw Delftse Poort administrative Nationale-Nederlanden building in Rotterdam (Figure 2-17). According to Jana Šindelová, Cigler created objects that connect "the entrance hall with galleries on the first floor as a single whole" (Cigler, Motyčka, & Šindelová, 2009, p 347). This work is an example of glass art in public space that can be categorized as public glass art, glass art installation, and architectural glass art.

Joost van Santen is a Dutch artist whose glass artworks have been installed in public spaces. *Ellipse of Light*, an architectural colored glass in the south facade of the railway station in Hilversum the Netherlands (Figure 2-18), and *Light Man Number 1* a sculptural glass art

installed in Wenceslas Square Prague Czech Republic (Figure 2-19) are two successfully executed of his works. An interview was conducted on 22<sup>nd</sup> of November 2016 with Joost Van Santen and some issues have been raised about the reasons for using glass as a material to execute his public artwork, he stated “Glass can be a beautiful material. The colored glass windows in the old cathedrals show the value of glass. Not only the colors are beautiful, but also the irregular hand-blown surface. The transparent characteristic offers me the possibility to use the material to show sun projections, which create dynamic images of my commissions in architecture and sculptures. They add value to the physical appearances of the artworks” (Van santen, personal communication, 22 November, 2016).

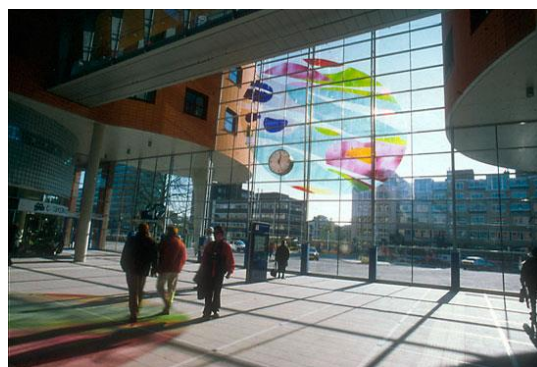


Figure 2-18. *Ellipse of Light*. Joost Van Santen. Amersfoort, Netherlands. 2001. ©Joost Van Santen.



Figure 2-19. *Light Man Number 1*. Joost Van Santen. Wenceslas Square Prague Czech Republic. 2004. ©Joost Van Santen.

Different artists have different attitudes toward working with glass. Each has its reasons to choose glass for creating artwork.

## 2.3 Techniques that Have Been Used in Contemporary Public Glass Art

In the past, glass was used for glassware, different crafts like jewelry, and religious or secular objects. It was determinant on the design of churches and chapels, where stained glass and colored glass were used profusely (depending on economic, technical, and artistic possibilities).

Whitehouse defines glassmaking into a three processing stages (Whitehouse, 2012). First, the process of melting raw material to make raw glass; second annealing and cooling process; “annealing is the specific time and temperature needed to relieve a piece of glass of strain; cooling is taking the glass, after it has been annealed, to room temperature” (Halem, 1996, p 16); third, a process that cooled glass object can be designed and decorated by different techniques such as engraving, cutting (Whitehouse, 2012). These three stages are related more to the glassblowing technique. Regarding several process stages of glass making, different techniques and technologies in each stage were invented and have been used. Václav Cigler is stated that “glass is probably the only material which can be continuously technologically developed and adapted for the implementation of the most fantastic notions and intentions” (Cigler, n.d).

Recently, we are witnessing an increase in the use of glass art in public spaces, combined with new techniques and technologies (Faghihi, Quintas, & Almeida, 2017 a). In this section, the examples of different techniques of glass art in public spaces projects are presented.

### 2.3.1 Stained Glass

‘*Stained glass technique*’ is the most used technique to decorate church windows for many years. Previously, the stained glass technique referred to small pieces of colored glass that are arranged to form a picture or patterns by strips of lead and support of the rigid frame. If the colored glass is assembled by lead, copper, or zinc, then, it can be called leaded glass (Vogel & Achilles 1993). One of the initial paint used on stained glass is Grisaille. The production involves mixing oxides metal such as iron or copper, with ground lead glass. This paint is applied with a brush to the glass sheet using gum Arabic as an agent and then fired at

650°–700°C. In the end, a thin layer of colorless glass is produced with embedded dark metal oxide (Machado, Machado, Palomar, & Vilarigues, 2019)<sup>53</sup>.

Jeffrey Sarmiento stated: “The biggest public art commissions in glass are still stained glass for churches” (Sarmiento, personal communication, 22 June, 2020). The stained glass technique is still prevalent in the church’s windows decoration; nevertheless, in recent decades it finds its way in architectural design and public arts. Today, in the contemporary context, there are some debates on defining the stained glass technique. The stained glass technique does not only refer to small pieces of colored glass assembled by Lead (copper or zinc), but it could be large panels of glass that can be assembled in Aluminum or Steel frames. A stained glass artwork can be painted, or not, can be installed in a building or it can be shown as an independent stained glass artwork such as the works of Judith Schaechter.

The *Dome of Light* (Figure 2-20) is one of the largest illuminated glass art domes in the world which is designed by Italian artist, *Narcissus Quagliata* in collaboration with *Derix Glasstudio* in Germany for the central metro station of Kaohsiung city in Taiwan (Quagliata 2014). In the glass production of the Dome of light’s underground glass ceiling, various techniques used such as etching, airbrushing, and fusing in the form of stained glass large panels. This glass dome is covering an area of about 2,180 m<sup>2</sup> and made up of 4,500 glass panels and its production in Derix Glasstudios took two years from 2005 to 2007 because of its size. It is inspired by stained glass windows and telling the story of human life in four quadrants, water, earth, light, and fire as symbols of birth, growth, glory, and destruction respectively. Also, two pillars in red and blue represent the principle Yin and Yang, which are the fundamental concept in Chinese philosophy (Ching-ching 2008) (“Anniversary of a very special project”, 2018). In the city of Kaohsiung with all its skyscrapers, diversity of parks, Lotus pond, and dragon and tiger pagodas, the *Dome of Light* is one of the tourist attractions which is loved by travelers and tourists. This architectural glass art which can also be considered as public glass art helps the marketing and economy of Kaohsiung (and also

---

<sup>53</sup> Grisaille became popular in Europe throughout the 12th century while the oldest grisaille glasses display Christ's figure, such as the Christ Pantocrator on a fragment of the sixth century located in the Ravenna National Museum (Italy) and Christ's Hand from 11th century, in the Notre-Dame Museum (Machado, Machado, Palomar, & Vilarigues, 2019).

Taiwan) by branding the city for its tourist attractions and captivated large sums and investments.



Figure 2-20. *Dome of Light*. Narcissus Quagliata in collaboration with Derix studio. central metro station of Kaohsiung. Taiwan. 2008. ©Narcissus Quagliata.

We have already witnessed that some countries use public art to attract tourists and investments. Tourism Ireland has created six freestanding stained glass windows to tribute to the series of the *Game of Thrones* which has millions of fans worldwide. Figure 2-21, Figure 2-22, Figure 2-23, Figure 2-24 show the images of these stained glass installations which are depicted the most shared, searched, and talked-about moments from across the entire game of Thrones saga. These installations were installed across the city of Belfast in Northern Ireland (Irish Central Staff, April 17, 2019). This leads the visitors to take a tour around the city to see the creative use of stained glass in Belfast which has a history and heritage of stained glass (especially stained glass windows of Saint Anne’s Cathedral). This series of stained glass have multifunctional usage. First, it is a memorial public glass art installation to tribute series of films which is filming most of the parts<sup>54</sup> in Northern Ireland. Second, it indicates Belfast’s heritage and culture for its history of stained glass. Third, it provides a tourist attraction for the fans of the Game of Thrones series to come and see them. As Niall Gibbons, CEO of Tourism Ireland, about the aim of this public glass art installation stated: “to highlight

---

<sup>54</sup> “About 75% of the show is filmed in Northern Ireland, both in natural settings and in the Titanic Studios in Belfast” (Associated press, 2014).



Northern Ireland – through the exciting events of Game of Thrones – on the global stage,” and he added: “This time, we’re taking Northern Ireland’s cultural and industrial heritage in stained glass and glass production and bringing it full circle – to celebrate Northern Ireland’s newest and biggest cultural export” (Irish Central Staff, April 17, 2019).



Figure 2-21. *House Stark*. The 1st stained glass window. On the grounds of Belfast City Hall, Ireland. ©publicis.co.uk.



Figure 2-22. *House Targaryen*. The 4th stained glass window. Belfast, Northern Ireland. 2019 ©BelfastGiants.



Figure 2-23. The 6th stained glass window. Belfast, Northern Ireland. ©IrishCentral.



Figure 2-24. *White walkers*- The 5th stained glass window. beside SS Nomadic at Hamilton Dock. ©downtownradi.



Even though the Games of Thrones series is over, we believe the stained glass installations in Belfast will retain its reputation as a destination to visitors because of the series' popularity and the attraction of light and colors of stained glass panels.

Another example of public stained glass art is created by twin brothers *Doug* and *Mike Starn* which is installed in 2015 at the Princeton University Art Museum in McCormick Hall on the campus of Princeton University (Figure 2-25). This work is Doug and Mike Starn's continuation of their exploration of organic systems through root and branch forms and is directly inspired by the arboretum-like character of the Princeton campus (Princeton University Art Museum, n.d.).



Figure 2-25. *(Any) Body Oddly Propped*. Doug and Mike Starn. The Princeton University Art Museum, New Jersey, USA. 2015.

### 2.3.2 Tiffany

Tiffany is a technique that creates an image by assembling pieces of colored glass<sup>55</sup> and using tin copper wire on the sides of the joints of the glass pieces (The glass needs to be extremely well cut). The final image could be flat such as a panel of a window or door. It can also be three-dimensional such as the shape of a lampshade or a lamp. Tiffany technique was developed and produced from 1878 to 1933 at the Tiffany Studios in New York, by Louis

---

<sup>55</sup> The glass can be Colored or Opalescent glass, Favrite glass, Streamer glass, Fracture glass, Fracture-streamer glass, Ring mottle glass, Ripple glass, Drapery glass.

Comfort Tiffany and a team of other designers, including Frederick Wilson and Clara Driscoll (Kastner, 2009).

The difference between stained glass and tiffany technique is that in stained glass a lead rail that can be in H or U shape (H – is assembling the glass pieces and has different thicknesses. U – is to ‘close’ the stained glass) is used to connect the glass pieces while in tiffany only a copper wire is used.

*The Manchester Lamps* (Figure 2-26, Figure 2-27) could be a great example of stained glass and Tiffany techniques inspiration for public glass art which is installed in the city of Manchester and includes five giant domestic lamps designed by *studio Acrylicize*. Each lamp tells a story of local historical innovation and also reflects the period by the lamp’s unique design style; Art Deco, Art Nouveau, Victorian, mid-century, and contemporary (Acrylicize, n.d.).

The motifs illustrated on the Art Deco lamp celebrate Earnest Rutherford, whose research conducted at Manchester University in 1932 led to the splitting of the first atom, whilst the book pages and fountain pen designs on the Art Nouveau lamp pay homage to the education and learning celebrated by Chetham’s Library, which lies in the heart of Manchester and is the UK’s oldest public library. Similarly, the honeycomb design lattices across the 1950’s bedside light denote the famous Mancunian ‘worker bee’ mantra, whilst the humble green desk light represents world-famous mathematician, Alan Turing, and his dedication to mathematics and computing technology via the famous Enigma code displayed overhead across the glowing green canopy. Finally, the modern Anglepoise lamp is turned upward, projecting a vibrant display of shape and color onto the surrounding wall, and representing the next chapter of this city’s compelling and ever-evolving story (Acrylicize, n.d.).



Figure 2-26. *The Manchester Lamps*. studio Acrylicize. Manchester. England. 2018. ©Acrylicize 2019.

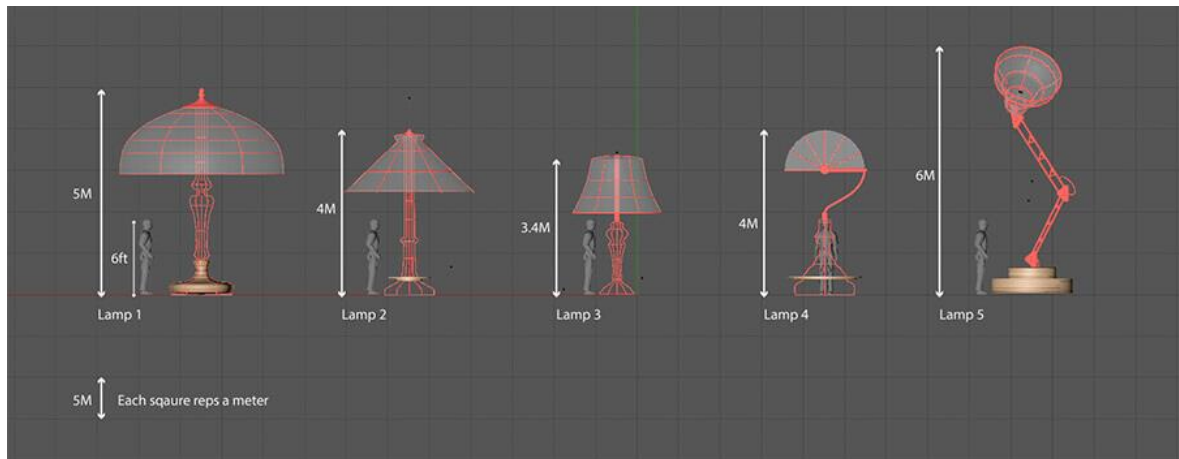


Figure 2-27. *The Manchester Lamps*. studio Acrylicize. Manchester. England. 2018. ©Acrylicize 2019.



### 2.3.3 Dalle de Verre

*Dalle de Verre* is a technique applied in architectural glass, consisting of “thick pieces of glass set into concrete blocks” (Neiswander, Swash, 2005, p. 274). ‘Dalle’ in French means slab or tile. In this technique, the small pieces of glass with about one inch (22mm) thick which have been chipped and shaped with a tungsten hammer, are placed in concrete. *Dalle de Verre* was developed by Jean Gaudin in the 1930s in Paris. Later in 1956, the technique was brought to the UK by Pierre Fourmaintraux<sup>56</sup> (Turner-Bishop, 2018).

For example, *Dalle de Verre* is used to cover the exterior façade of the New York Hall of Science (Figure 2-28). The building is constructed in 1964-1965 as the New York Museum of Science and Technology, designed by Wallace K. Harrison of the architectural firm Harrison and Abramowitz. The Façade of this tower consists of approximately 5,400 cells that each *Dalle de Verre* panel is set in a cast-in-place concrete matrix and reinforced with approximately 20 cobalt blue glass polygons of varying sizes (Figure 2-29) (Pepi, Buchner, & Gembinski, 2014).



Figure 2-28. New York Hall of Science. Queens, New York. built-in 1965. © 2019 Rethinking Internet Media Pvt Ltd.



Figure 2-29. Cobalt Dalle de Verre panels. © Jeff Goldberg/Esto.

---

<sup>56</sup> Pierre Fourmaintraux was born in 1896 in France and died in 1974 in the UK. After second world he joined James Powell and Sons (later Whitefriars Glass) in the UK. From 1956 he was Powell’s chief designer of slab glass and abstract windows (Turner-Bishop, 2018).

### 2.3.4 Film on Glass

Another technique, which is used for public glass art installations, is ‘*Film on glass*’. There are five major categories of the film in current use: etched, colored, digitally printed, dichroic, and holographic film. This technique has advantages and disadvantages. One of its greatest advantages is that it can be temporary so the film may be removed or replaced with a new image. Besides its merit, the downside of this technique is that it can be relatively scraped, cut, or damaged (Faghihi, Quintas, & Almeida, 2017 a). Nevertheless, the location is imperative when using a film application (Moor, 2006). *Tide and time* is an architectural glass art wall in Plantation lane in the city of London that is located at the midpoint of the alleyway and follow the slight curve of it with 41m long and 6m height (Figure 2-30, Figure 2-31). This backlit screen is made from printed film laminated between two layers of 12mm low-iron glass, with an anti-reflective low-acid external finish. It has an image of the moon as a symbol of “the continuum between the many generations of traders in London” (Davis landscape architecture, 2014) (Moor, 2006, pp. 172-173).



Figure 2-30. *Time and tide*. Declan O’Carroll and Arup Associates. Plantation Place, London, 2005. 41x6m.



Figure 2-31. The left image shows *Time and tide* at daylight. ©Parinaz Faghihi.

Susan Kaprov is an award-winning artist who is known for her multi-disciplinary practice which encompasses photography, painting, drawing, video animation, hand-colored pigment prints, and fired enamel on glass. She designed fifty-five bus stations in Sahara Avenue which

is the largest Transportation corridor in Las Vegas, Nevada, USA (Figure 2-32, Figure 2-33) (Kaprov, n.d.). She explained how she used this technique for this bus station:

I used two 1/2-inch-thick, sandwiched UV-resistant coated glass panels with a UV-resistant acrylic photographic interlayer. All the artworks are first created as high-resolution digital files using Photoshop, Illustrator and other imaging systems. I often made some of the images appear hand-painted. The files are then printed to scale onto the acrylic photographic interlayer and placed in between the glass panels. Each artwork is then fitted into a sealed stainless steel frame and then permanently installed at the various sites (Kaprov, Personal communication, 8 August, 2019).

The technique that Kaprov used for designing the bus stations combined a possibility of using different digital techniques, a variety of colors, printing high resolution, and high quality of the image. In contrast, the interlayer image could be modified whenever appropriate. Moreover, the light passes through the image in between the glasses, sparkling and creating colorful dancing shadows.

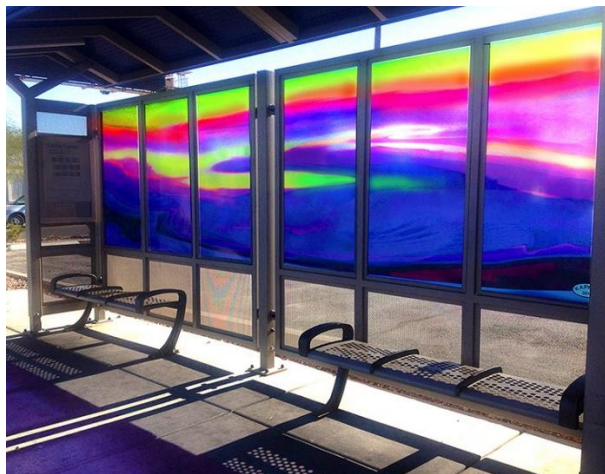


Figure 2-32. *Desert Purple*. Susan Kaprov. Las Vegas Bus Stations, USA. 2014. Dimensions: 5 ft high x 20 feet wide. ©Susan Kaprov 2019.



Figure 2-33. *Spring Mountains*. Susan Kaprov. Las Vegas Bus Stations, USA. 2014. Dimensions: 5 ft high x 20 feet wide. ©Susan Kaprov 2019.



### 2.3.5 Lamination, Tempered/Toughened Glass Techniques

Lamination means two or more sheets of float or tempered glass with one or more interlayers combined and processed by autoclaving at 1400°C and pressure up to 14Bar. The most common interlayer used in lamination is Polyvinyl butyral<sup>57</sup> (PVB) (Khatib, 2016). *Reason to be* (Figure 2-34) is an interactive public glass art which is created by Jessica Jackson Hutchins for Seattle Art Fair 2017. The artist was selected for the artist-in-residence at Bullseye Studio. Therefore, she redesigned a decommissioned bus shelter in Portland, Oregon by kiln-formed and laminated glass panels in a way that local people can enjoy its colorful design and have some fun with it (Bullseye Studio, n.d.).

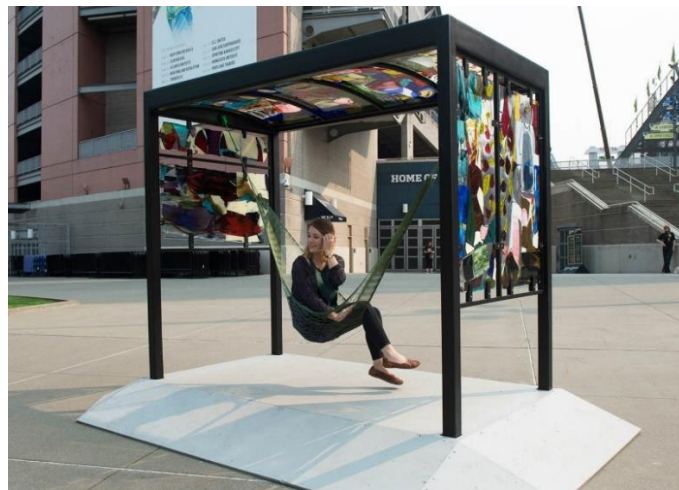


Figure 2-34. *Reason to Be*. Jessica Jackson Hutchins. Portland, Oregon, United States. 2017. © Jessica Jackson Hutchins. Photo by Joseph Freeman.

Tempered or toughened glass is a normal glass (with all features of glass such as transparency, color, and parallel surface) which is manufactured by the special thermal process when strength, thermal resistance, and safety are important considerations. Before the tempering process, the normal float glass should be cut to size or pressed to shape, drilled the holes, ground, and polished the edges if necessary. Because no alteration can be done in tempered glass (Khatib, 2016).

---

<sup>57</sup> Polyvinyl butyral (or PVB) is a resin mostly used for applications that require strong binding, optical clarity, adhesion to many surfaces, toughness and flexibility.

During the tempering (toughening) process, float glass is heated to about 620-675°C in a furnace and then quenched by jets of air. When cooled the glass surface solidifies first whilst the interior remains hot. When the interior cools the thermal shrinkage is resisted by a rigid solid surface, and as a result, a residual stress field with tensile stresses in the mid-thickness region is developed. The subsurface tensile stresses are then balanced by compressive residual stresses developed in the surface region (Khatib, 2016, p. 97).

Tempered glass is about 3-5 times more expensive than float glass, but it is strong enough to withstand sledgehammer tacks (Khatib, 2016).

Heat-strengthened glass is manufactured in the same way as fully toughened glass, with the difference that, the heated float glass is quenched at a slower cooling rate than used for full-tempered. Therefore, it has a low surface precompression in comparison to fully tempered glass (Khatib, 2016).

Another example is sculptural glass art, *Helping hands*, in Cramlington hospital which is executed by Cate Watkinson in collaboration with Colin Rennie (Figure 2-35). For creating this sculpture, waterjet cut, textured, laminated, and toughened glass, with a satin polished stainless steel base are used.



Figure 2-35. *Helping hands*. Cate Watkinson in collaboration with Colin Rennie. Hospital in Cramlington, England. 2015. ©www.watkinsonglass.com.



### 2.3.6 Screen Printing

Screen printing on glass is a technique that refers to the process of printing on glass and can be used for the creation of large-scale architectural projects to plinth based gallery works. Therefore, this is a combination of glass art and printmaking as Kevin Petrie<sup>58</sup> refers, screen printing can be used in many glass techniques such as fusing technique between glass plates, casting in the interior of the pieces, blowing with the help of decals to create three-dimensional pieces, or directly onto glass sheets (Petrie, 2006).

Screen printing can be done manually or digitally which is a suitable method for authentic reproduction of photographic pictures, repeating ornament shapes, scriptures, printing. The digital printing is explained in the next subchapter (2.3.7). Screen printing which is commonly called silk-screening refers to the original material from silk-screen printing which the screens were made (Figure 2-36). The process of screen printing on glass is explained in the following steps:

1. The drawing/ design needs to be prepared, then print each color of the design on the transparent acetate film. This will be used to create the stencil.
2. After this process, the screen needs to be prepared. Depending on the complexity of the design the mesh screen should be chosen. It is necessary to have separated screen frames for each color of the image. Then the mesh screen should be coated with a layer of light-reactive emulsion, which will harden when developed under bright light (Custom planet, n.d.).
3. Afterwards, the acetate sheet needs to be fixed on the emulsion-coated screen and the whole thing is exposed to very bright light. The light hardens the emulsion-coated, so those parts of the screen that did not get the light are not hard and can be washed off. Then any unhardened emulsion is rinsed off by a water pressure Washer carefully from the screen. Therefore, a clear imprint of the design will

---

<sup>58</sup> Kevin Petrie is an artist, author, and professor of glass and ceramic at the National Glass Centre, University of Sunderland. He is mainly known for blending printmaking and glass/ceramics for creating artworks. He wrote two books in glass and print and ceramics transfer printing (Petrie, n.d.)

leave on the screen. After the screen is dried, the stencil is ready to be used for printing.

4. Now, the screen needed to be fixed onto the printing board and prepare the flat glass for printing. So, the glass should be cleaned with rubbing alcohol or ethanol to eliminate all the fat and dirt. Then, ink is applied to the screen's top end, and a squeegee is used to move the ink along the screen's full length, and the image will be printed on the glass (Custom planet, n.d.) (Sarmiento, 2011). If there is a multicolor image, this process should be repeated for each color.
5. After the printed color/colors on the flat glass get dried, the glass should be placed into the kiln and the temperature depends on the type of the ink applied.

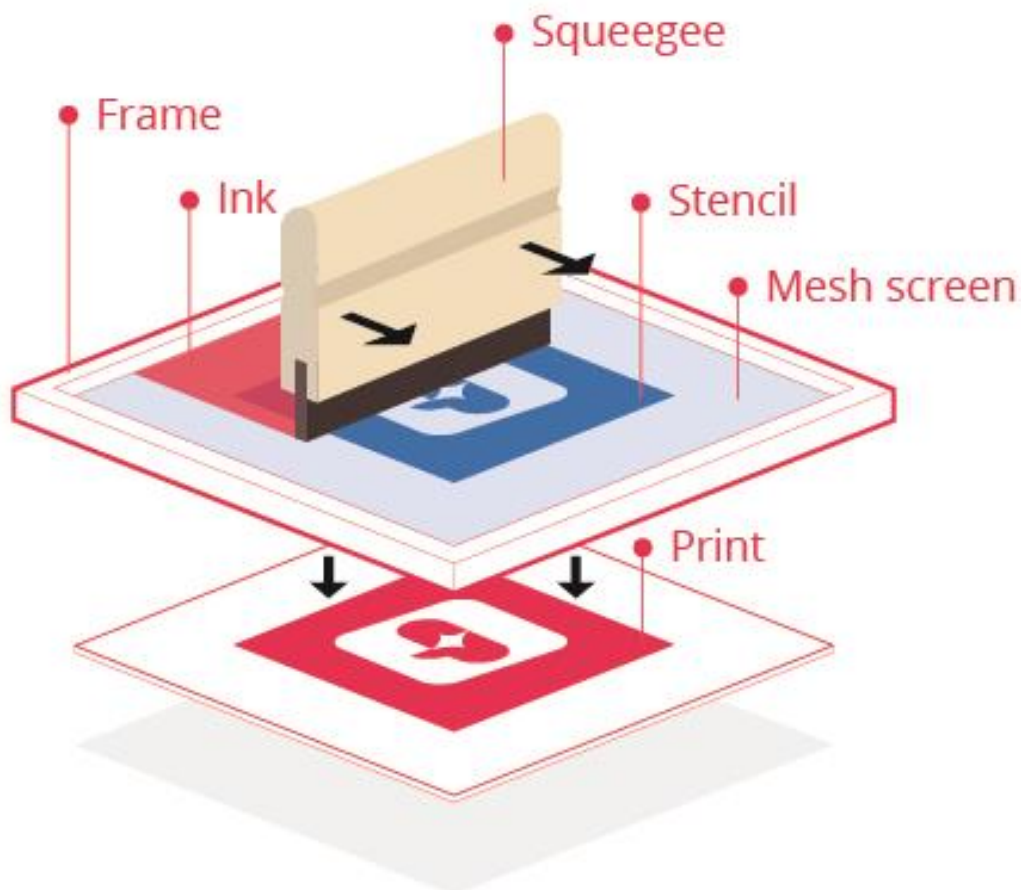


Figure 2-36. Screen Printing Equipment. © 2019 Custom Planet Ltd.



Figure 2-37. Jeffrey Sarmiento Screen printing enamels onto a long sheet of glass. ©Jeffrey Sarmiento



Figure 2-38. Squeegees color through large screens – Project for Portnoy Residence in Hillsborough, USA, Design by the cooperation of artists Janssen and Wood. ©2019 Derix Glasstudios.

Screen printing is one of the techniques used to transfer the graphics or designs to large sheets of glass (Figure 2-37) (Figure 2-38) (Figure 2-85).



Figure 2-39. *Confluence*. Jeffrey Sarmiento. Durham, UK. 2018. ©Kevin Petrie. (Petrie, 2019, p8).

*Confluence* (Figure 2-39) is a public glass art in Durham City Centre, the UK, created by Jeffrey Sarmiento. In this work, Sarmiento used screen-printed and kiln formed glass prisms. About this work, Kevin Petrie stated that:

It is innovative in that it builds on the use of multiple layers of colored half-tone screen-prints to create a lenticular image, visible through the clear glass. To create such a work at a large scale, the two images (one of the technical drawing of the screw, the second of the history of bishops and patronage) have been segmented into 54 individual prism-shaped fused glass elements, so that the printed images are embedded into the glass (Petrie, 2019, p. 8).

However, Jeffrey Sarmiento and Kevin Petrie are two of the artists who used screen printing in the creation of their artworks in the UK, especially in architectural public glass art projects. This technique is prevalent in glass and architecture.

### 2.3.7 Digital Printing

Digital working methods are recently more used for public glass art projects because they are more economical, suitable for the production of complex forms, and it is faster and in some cases are cheaper in terms of manufacturing methods (Cutler, 2012). Digital printing enamels on glass is another possibility of the new technology which artists recently used to design the building's façade and their conceptual ideas in public spaces. This technique is more popular while the use of computer design software and colorful 3D effect are inclusive. The ink-jet system provides a faster, much lower cost with the multicolored image at once instead of being screen-printed onto the glass one color at a time. In the digital glass printing process (Figure 2-40), images are scanned into a matrix of dots, called pixels, which are used to digitally control the ink, toner, or electromagnetic energy to reproduce the imagery (Wightman, 2011).



Figure 2-40. The digital glass printing process.

Charlie and Joan Smith are local sculptors who designed *Anzac Memorial* for Ocean Beach RSL in Perth - a city in southwest Australia- and created a stunning memorial arch in

commemoration of the centenary, which forms a commanding presence at the club's location 28km north of the Perth CBD (Figure 2-41). The memorial is comprised of an 11m x 5.5m steel arch, fitted with 13.52mm toughened laminated and digitally printed glass (Dip-Tech Digital Printing Technologies Ltd, 2015).



Figure 2-41. *Anzac Memorial*. Charlie and Joan Smith. Ocean Beach RSL, Perth, Australia. 2015. Digital print on 13.52mm toughened laminated glass. © 2015 Dip-Tech Digital Printing Technologies Ltd

Digital printing enamels are also used for the creation of architectural public glass art in large glass panels such as in train stations, airports, the entrance of buildings, and building façade.

For example, in the International Airport Hong Kong (Figure 2-42 and Figure 2-43), China, in arrival and departure hall 117 glass panels spanning a total space of 507 square meters. This architectural public glass art is designed by Graham Jones in three-dimensional images, with a combination of airbrushing technology and backside digital printing.





Figure 2-42. *International Airport in Hong Kong*. Arrival hall. Graham Jones. 2016. 202m<sup>2</sup>. ©Andrew Moor Associates.



Figure 2-43. *International Airport in Hong Kong*. Departure hall. Graham Jones. 2016. 305m<sup>2</sup>. ©Andrew Moor Associates.

### 2.3.8 Painting on Glass

Painting on glass was first made with grisailles in stained glass as explained in 2.3.1. In this subchapter, glass paint that is not leaded is addressed. Grisailles are still used by the artists, but the color range increased, and vitreous enamels are being used. Hand painting is also used in designing Architectural and public glass art pieces. *Metamorphosis* in Raleigh Durham Airport, Terminal 1, North Carolina (Figure 2-44) is the other example of architectural public glass art which is designed by Martin Donlin. It is hand-painted with ceramic enamel on tempered laminated glass in 25ft X50ft. This work has bold images and colors that indicate details of natural scenery and vegetation of the Raleigh, Durham, and Chapel Hill area (Donlin, n.d.).



Figure 2-44. *Metamorphosis*. Martin Donlin. Terminal 1 Ticketing Lobby and Security Checkpoint Raleigh Durham Airport, North Carolina, USA. ©Martin Donlin 2014.

*Going Away, Coming Home* is an architectural public glass art done by Hung Liu for Oakland International airport (Figure 2-45) (Liu, n.d.). The artist is well known for her painting style of layered washes and dripping paint-techniques which is evocative of Chinese calligraphy and Abstract Expressionism. The background of this work is digital satellite imagery which is produced by the multiple processes and kiln firing. Every cloud, crane, and circle were sandblasted, each golden longitude, latitude, and geographic demarcation line skillfully

airbrushed by hand (Going Away, Coming Home, n.d.). There is a quotation for the description of the artist and her work that was written on a plaque from the I Ching which expresses the spirit of the work in a beautifully poetic way: “There is nothing that involves only going without returning. It is the nature of Heaven and Earth. When there is going, there also must be returning” (Worth, 2015). On the description plaque, it is stated that Hung Liu drew the red-crowned crane as a symbol of peace, purity, wisdom, fidelity, prosperity, and longevity for countries. She also drew circles as a symbol of endlessness, eternity, endlessness, emptiness, and wholeness. The color red in China is considered to bring good luck and joy for the travelers (Worth, 2015). Besides the technique that the artist used, the images and colors create a combination of old ideas and techniques with new and novel ideas and techniques.



Figure 2-45. *Going Away, Coming Home*. Hung Liu. Oakland International Airport, Terminal 2 Window Project, 10' x 160', Oakland, California, USA. 2006. ©Hung Liu 2016.



### 2.3.9 Layered Glass

Layered glass is a sculptural, or relief piece made with several layers of glass. Different thicknesses of glass can be used. Ernest Vitin is an artist whose layered public glass sculptures are known mostly in Latvia and the Baltic state. In his webpage he explained the process of creating a layered glass sculpture this way (Figure 2-46, Figure 2-47, Figure 2-48, Figure 2-49, Figure 2-50, and Figure 2-51) (Vitin, n.d.):

In the work *In Nature*, first, the idea is idealized, then it is visualized and were created a 3D digital model (Figure 2-46), then a prototype of the sculpture in actual size is produced (Figure 2-47). After that, layers of glass were cut regarding the model.

Each module consists of unique, hand-cut 8mm thick glass layers, which were first developed in a 1:1 prototype using foam rubber. Being an exact replica of the original, it consisted of over 10 000 individuals, numbered layers. No two elements in this composition are alike (Vitin, n.d.).

The next step is hand treatment (Figure 2-48) which is essential in achieving the undulated rhythm of the glass and making sure about the safety of the sculpture (smoothing the edges) and checking if it does not yield an industrially produced effect. Later, the process of gluing the layers (the glue needs to be the best quality and durable) upon each other is done by hand carefully due to several factors:

The irregular forms of the edges have to converge to render smooth transition between them. Secondly, the glue has to be applied evenly across each piece to elude the tilting of the structure. And finally, the glue has to be applied very close to the edges to prevent dust from settling in the barely visible slits (Vitin, n.d.).

The next step is shipping the glass layers which are built into blocks that can be lifted by a single human and transported to the building site (Figure 2-49). Finally, installing (Figure 2-50) the structure and if needed, extending led wire and distributing the light across the whole sculpture (Figure 2-51) (Vitin, n.d.).

The glass layered sculpture *In Nature* is an architectural sculptural glass art (Figure 2-50, Figure 2-51) which is executed by Ernest Vitin is inspired by the pine trees (the most common type of tree in Latvia's forest with about 40% of the total forest area) that have tall and slender forms held up by very strong roots. Like humans... it is considered as a reflection of Latvian pride and patriotism in the University of Latvia which is the most important institution of higher education in the country and any Latvian would be proud to be studying there (Vitin, n.d.).

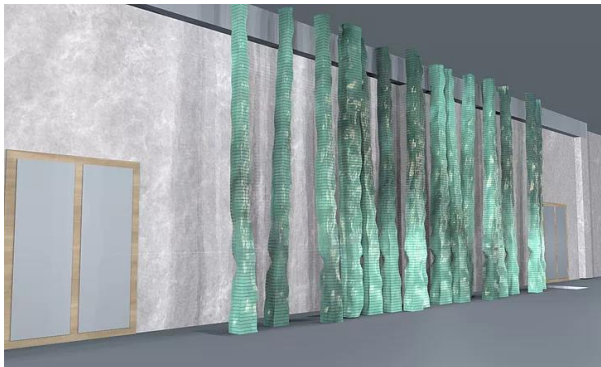


Figure 2-46. 3D image of *In Nature*. Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019.



Figure 2-47. Prototype of *In Nature*. Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019.



Figure 2-48. Cutting and hand treatment. *In Nature*. Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019.



Figure 2-49. Blocks of layered glass are ready for shipping. *In Nature*, Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019.



Figure 2-50. Final installation. In Nature. Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019.



Figure 2-51. Lightening the project. In Nature. Ernest Vitin. 2015. Academic Center for Natural Sciences of the University of Latvia. ©ErnestVitin 2019.

There are other artists such as Herman Lamers<sup>59</sup>, Dustin Yellin, Costas Varotsos who created public glass art pieces with layered glass techniques.

The Greek artist Costas Varotsos has created a sculptural public glass art *Dromeas* or *The Runner* (Figure 2-52), in 40-foot-tall (about 12 meters) with about thousands of shards of glass in 1988 in Athens's Omonia Square. Later, in 1994 the city moved the runner to Megalis tou Genous Sholi square because of underground metro vibrations which would topple the piece (Sierzputowski, 2018) (Varotsos, n.d.). This work demonstrates an exact moment of winning of a runner that can be interpreted as a Marathon or the speed and effort of humankind in modern life to achieve his desires.

*L' Approdo* (Figure 2-53) is another example of public glass art that is executed with the same technique in memory of the Albanian ship *Kater I Rades*, a ship that sank on March 28, 1997<sup>60</sup>. *L' Approdo* is a significant example of a public glass art project as this work is site-specified, openly accessible to everyone, engaged people's minds about a specific event, and created. Moreover, it is an eye-catching expressive object.

---

<sup>59</sup> Please see chapter 4.2.2.

<sup>60</sup> The ship sank in the Strait of Otranto, 25 nautical miles from the coast of Puglia, Italy. About 81 people (which 61 of them were women and children) died in the shipwreck (Varotsos, n.d.).



Figure 2-52. *The Runner*. Costas Varotsos. 1988-1994. Athens, Greece. © 2019 Colossal.



Figure 2-53. *L'Approdo*. Costas Varotsos. 2012. Otranto, Italy. © Costas Varotsos. Photo by M.Stallop.

### 2.3.10 Blowing

Blowing is a glass-forming technique that inflates molten glass into a bubble using a blowpipe. The blowing technique can be executed by two methods, Free- blowing and Mold- blowing.

Free blowing is a method that short puffs of air are blown into a molten portion of glass called 'gather' which is spooled at the end of the blowpipe. Then the glass-blower will be able to quickly inflate the molten glass into a cohesive blob and transform it into a specific shape (Cummings, 2002).

In the mold-blowing technique, the molten glass which is placed on the end of the blowpipe is inflated into a wooden or metal mold, so the glass takes the shape and texture of mold (Cummings, 2002).

Glass blowing is one of the oldest techniques of glassworking. According to Charles Bray (2001):

Some historians place the discovery of blown glass between 27BC, and AD 14 in the region in or near Syria. It then developed quickly into Rome where factories became established and into Greece and other lands bordering the Mediterranean. From there, it spread throughout Europ (p. 50).

In the twentieth century, the studio glass movement significantly influenced the development of artistic glass blowing.

*The Light of Jerusalem* (Figure 2-54) was a project done by Dale Chihuly in 2000. More than one million visitors visited this artwork. This was a project for exhibiting Dale's glass art installations and sculptures in Jerusalem where some of the oldest glass blown in the world had been made about 40 B.C. (Meisner, 2008). Regarding this project, on the webpage of the Tower of David/the History Museum of Jerusalem, it is explained that:

In order to build the exhibition, which was complex in terms of structure, size, and scope, 10,000 pieces of glass were transported in 12 shipping containers from Japan, the United States, and Finland. Thirty assistants, including glass blowers, engineers, and a technical team, arrived in Israel with Chihuly, and together with



a large local team, built the exhibition over a number of weeks. Engineers along with expert climbers mounted the glassworks on huge iron constructions built around the citadel in a complex operation (Tower of David - The Museum of the History of Jerusalem, n.d.).

The inspiration for *the light of Jerusalem* came from the history, people, landmarks, and architecture of Jerusalem (Saltzman, 2016).



Figure 2-54. Images of the project *The Light of Jerusalem*. Dale Chihuly. Jerusalem, Israel. 2000.  
©Chihuly, Inc.

Masuda Hiromi is a Japanese glass artist that her installation titled *Play the glass* is one of the most famous works that she had done (Figure 2-55). She used the glass blowing technique in the execution of her glass art installation.

Hiromi demonstrated the blown bubbles in various installations in different places. The title she used for her series of glass blow bubbles refers to the pleasure she experiences when creating glass bubbles like a child blowing bubbles. For her manipulating the blowpipe is like playing a musical instrument with enthusiasm (Jawawa, 2004). The characteristic of her work has a feminine taste which transfers the pleasure she experienced while creating the bubbles to the audience.

Dante Marioni, Fritz Driesbach, and Marvin Lipofsky are some of the modern glass artists who used glass blowing technique in their artworks that shows the capacity of this technique in the creation of public glass art pieces.



Figure 2-55. *Play the glass*. Masuda Hiromi. Church of St Francesco, Venice, Italy. 2003. ©Masuda Hiromi.

### 2.3.11 Lampworking

Lampworking is a type of glasswork technique that uses the torch or lamp to melt the glass tubes<sup>61</sup>. The torch mixes the oxygen and methane gas (it could also be propane or natural gas) to obtain proper combustion in order to achieve a hot flame for melting the glass (Smith Davidson Gallery, n.d.). The glass used for lampworking is usually soft glass such as soda-lime glass and lead glass or it can be hard glass such as borosilicate glass. The tools (Figure 2-56) used for lampworking are quite similar to those used in glassblowing (Graphite or steel can be used for the working surface of the lampworking tools). In this technique, the manual skill of the worker is very important to have an elaborate glass object.

---

<sup>61</sup> Lampworkers usually use rods of glass in different sizes from 7-8 mm to 15mm or more.



Figure 2-56. Tools for lampworking. ©Parinaz Faghihi

Mauro Bonaventura is an Italian glass artist whose glassworks are in the Corning Museum of glass, Carnegie Museum of Art, Glass Museum Alter Hof Herding, Hida Takayama Museum of Art, and other museums and galleries all over the world (Smith Davidson Gallery, n.d.). The technique he uses for creating artworks is mostly lampworking. *Red Biosphere* is one of his works that was presented in Venice in 2004 (Figure 2-57).



Figure 2-57. *Red biosphere*. Mauro Bonaventura. Venice, Italy. 2004. © Mauro Bonaventura.



Figure 2-58. *Badener Forest*. Susan Liebold. Germany 2011. ©Susan Liebold.



Susan Liebold is a German artist who created phosphorescent light sculptures with a lampworking technique (Arnold, 2009). Figure 2-58 shows the image of her sculptures in a forest that creates a mysterious and mythical atmosphere with phosphorescent glass.

The Lampworking technique usually creates delicate pieces and because of this feature, in public spaces, it is used mostly for temporary installations or sculptures.

### 2.3.12 Etched Glass and Sandblasting

Acid etching and sandblasting are techniques that are used for drawing, writing, and create creative designs on the glass surface. The etching is a technique that uses hydrofluoric acid, caustic or abrasive substances for dissolving or removing a thin layer of the glass surface, and it can be done by a machine (such as sandblasting) or manual (Hanley, & Plesscher, 1988). “Grinding or abrasion of the glass surface by high pressure blasting of sand or aluminum granules with an airbrush gun onto the glass surface. Such treated glass will show a matt surface” (“Sandblasting”, n.d.). During the acid etching, protective clothing is required (“Acid Etching”, n.d.).

Clifford Rainey is a British artist who employs cast glass and drawing as primary methodologies. In Lime Street Railway Station in Liverpool, he used etched tempered glass technique to design a 12'H x 170'W glass panel (Figure 2-59) (“Clifford Rainey”, n.d.).



Figure 2-59. *Little Gidding*. Lime Street Railway Station, Liverpool, UK. 1984. © Clifford Rainey.

Another example of colored glass etched is in the *Spektrum* glass wall in the function room of the Sparkassenakademie Stuttgart, in Germany (Figure 2-60, Figure 2-61). Raphael Seitz as an artist, in collaboration with Derix Glasstudios and Lamberts Glas, created six windows like glass walls each approximately 3 x 5 meters as well as two door systems. According to the Derix Glasstudios:

Hand-blown glass with double flashes have been slightly acid-etched to create soft color gradations within the glass sheets. Vitreous enamels have been airbrushed additionally to enhance certain color contrasts. Screen printing was used for texts. All hand-blown glass sheets are laminated evenly onto the surface of the triple-insulated glass units by liquid lamination technique (*Spektrum Sparkassenakademie Stuttgart, n.d.*).

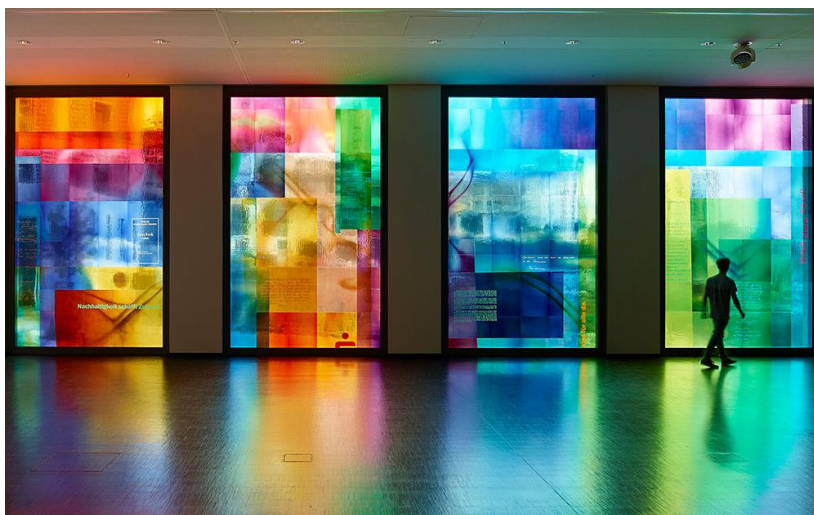


Figure 2-60. *Spektrum*. Raphael Seitz. Stuttgart, Germany. 2014. © Derix Glasstudios.

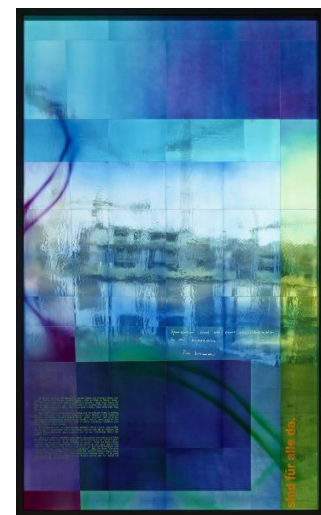


Figure 2-61. *Spektrum*. Raphael Seitz. Stuttgart, Germany. 2014. ©photo: .Jens Weber

*Spektrum* demonstrated high quality and luminosity of glass on a large scale Architectural glass art units by employing several glass art techniques.

### 2.3.13 Kiln Forming

According to Helga Watkins-Baker kiln-forming glass “is the process of heating glass in a kiln until it becomes malleable enough to melt together or flow into a mold” (Watkins-Baker, 2010, p. 9)

Several techniques fall into this category such as fusing, slumping, casting, wax casting, *pâte-de-verre*, and sand casting. However, casting and *pâte-de-verre* are usually integrated into the kiln casting category and some artists refer to sand casting as a hot casting technique.

In the following subchapters, we will explain these different techniques.

#### 2.3.13.1 Fusing

Fusing refers to the technique of joining two or more pieces of glass or frit, powder, rod, and stringer (the glass pieces should be compatible<sup>62</sup>) in the kiln by the heat. The fusing technique can be done in two methods: 1) Tack fusing, 2) full fusing (“What is fusing?”, n.d.). Tack fusing is a fusing technique when the pieces of glass are heated until they are just hot enough to stick together and retain many of their own characteristics (Figure 2-62). In full fusing, the pieces of glass are heated to a higher temperature until they become molten and as one soft piece of glass (Figure 2-63) (“What is fusing?”, n.d.). In this technique, it is more common to use glass sheets. The temperature range depends on several factors, type of glass, thickness, and kiln, although we can say that tack fusing is from 700°-750°C and full fusing from 750°-800°C (Watkins-Baker, 2010).



Figure 2-62. Tack fusing.



Figure 2-63. Full fusing.

---

<sup>62</sup> In fusing technique, it is important to use the same type of glass to be compatible, otherwise, the final piece may have cracks. This is a rule that should be apply to the other techniques .

*Telling Our Story* is the title of the glass tower (Figure 2-64) at the entry of the Peppermill community center in Washington. It is created by involving the community<sup>63</sup> via a series of glass-making workshops held at the Washington Glass School. The technique used in this site-specific sculptural public glass art is fusing over 100 glass inset panels (Figure 2-65) (The Washington Glass School, 2019). According to Washington glass school, an inclusive mixture of images – each distinctive and unique – yet cohesive as a whole “Shaping places—with landmarks and landscapes, events and ideologies—sets the stage for a critical part of our existence: our connection with our environment; with our past, present, and future; and with other human beings” (The Washington Glass School, 2019).



Figure 2-64. *Telling our story*. Washington Glass Studio. Peppermill Community Center. Washington, USA. 2019. ©Washington Glass Studio.



Figure 2-65. Details of *Telling our story*. Washington, USA. 2019. ©Washington Glass Studio.

The fusing technique is also used in several public art projects besides other glass art techniques such as in *Dome of Light* in Taiwan (Figure 2-20), the glass facade of the

<sup>63</sup> Erwin Timmers leads a community glass making workshop at the Washington Glass School (The Washington Glass School, 2019).

Netherlands Institute for Sound and Vision in the Netherlands (Figure 2-66), and *Liverpool Map* by Jeffrey Sarmiento (Figure 2-85).

### 2.3.13.2 Slumping

Slumping is a kiln-forming technique that transforms sheet glass/float glass (other glasses can also be used) into the shape of a mold using heat and gravity (“What is slumping?” n.d.), it refers to the technique of bending glass and create a new shape, form or texture (Watkins-Baker, 2010, p. 9) by high temperature (depends on the type of the kiln and the glass used, we can have glass deformations above 600°C (Almeida, 2011)) the float glass melted and the power of gravity forces the glass to the mold, so, the glass picks up the texture of the mold.

Slumping is used for the creation of small glass forms as well as the large panels. This technique can be combined with other glass art techniques to create amazing artworks. For instance, the glass facade of the Netherlands Institute for Sound and Vision<sup>64</sup> in Hilversum (Figure 2-66) gives the building a strong and colorful expression. The building has a museum, exhibition, office and archive. It is designed like a cube which half of that is the underground where car parks and the storage area of the archives (Budzyńska, 2016). The building designed by Neutelings Riedijk and the glass façade of the building is created by graphic designer Jaap Drupsteen, in collaboration with glass company Saint Gobain and TNO. Drupsteen picked 768 pictures from the Sound and Vision collection and then abstracted them to prevent becoming too descriptive on the outside walls (Figure 2-67). Each of the 2244 glass panels has a unique relief and color pattern (Beeldengeluid, n.d.). It takes three years to create the whole façade which almost the entire building is covered with the glass panels. These glass panels are made by combining the slumping technique and color enamels (Figure 2-68 and Figure 2-69) (Budzyńska, 2016). In the creation of glass panels for this building, other techniques are used, such as screen printing and digital printing, glass enamels, laminated glass, glued glass, fusing, and slumping (Budzyńska, 2016).

---

<sup>64</sup> Het Nederlands Instituut voor Beeld en Geluid (abbreviated Beeld en Geluid).



In the conceptual sculpture *Patchwork Man* made by Max Jacquard (Figure 2-70), the slumping technique is used, and the small cut glasses are assembled with patch-working<sup>65</sup> technique. Max Jacquard explained his work: “The patchwork figure series was a journey into the darker aspects of self-portraiture using a linked glass fabric or armor as a container for the body. The covering looks strong but is visually light and delicate” (Jacquard, n.d.).



Figure 2-66. Institute for Sound and Vision. Hilversum, Netherlands. 2006. ©Jaap Drupsteen.



Figure 2-67. The glass panels details of the Institute for Sound and Vision. Hilversum, Netherlands. 2006. ©Jaap Drupsteen.

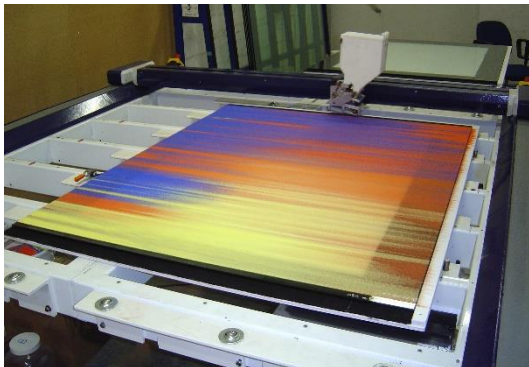


Figure 2-68. printing the enamels on glass panels of the Institute for Sound and Vision. Hilversum, Netherlands. 2006. ©Jaap Drupsteen.



Figure 2-69. The glass panels details of the Institute for Sound and Vision. Hilversum, Netherlands. 2006. ©Jaap Drupsteen.

---

<sup>65</sup> Patch-working technique is a form of needlework in which two or more pieces of cloth are sewn together to create a larger piece. This technique has been used for hundreds of years probably due to the need for (expensive) textiles to be reused (V&A online catalogue, 2017).



Figure 2-70. *Patchwork Man*. Max Jacquard. (n.d). ©Photographer: Simon Kendrick.

### 2.3.14 Kiln Casting

According to Keith Cummings “All glass casting utilizes the liquid nature of hot glass and its reaction to gravity, that is to say, its pourability” (Cummings, 2002, p 21). The difference between kiln casting and kiln forming is that in kiln casting mold is needed to make the final glass piece, and in kiln forming it is not necessary to have a mold. So, kiln casting techniques include casting, wax casting, sand casting, and *pâte-de-verre*.

#### 2.3.14.1 Casting

Casting in glass workshops means:

ladling hot glass from a furnace into a pre-heated mold, by melting glass in a crucible from which it is poured into a mold, or by heating both mold and glass together in a kiln until the glass assumes the form defined by the mold (Bray, 2001, p. 68).

Kiln casting involves making a mold that is often produced from a combination of plaster and refractory substances such as silica (Layton, 1996). The mold can be shaped by a model of any solid material such as wax, wood, metal, clay, among others. After taking the shape of the model, it must be removed from the mold. Then, the mold is ready to be put in the kiln and receiving the molted glass.

Contemporary artists such as Clifford Rainey, Karen La Monte, and Tomasz Urbanowicz, Ann Robinson, Ana Thiel used casting techniques in the creation of their artworks and sculptures.

The sculptural glass *Celtic Cross* is a commission for St John's Church, Copthome, Sussex, in the UK created by Colin Reid <sup>66</sup> (Figure 2-71). It is an example of cast optical glass/crystal in which lettering was designed by Charmian Mocatta (Reid, n.d.).



Figure 2-71. *Celtic Cross*. Colin Reid. St John's Church, Copthome, Sussex, UK. 2006. Height: 150cm. ©David Mocatta.

---

<sup>66</sup> Colin Reid (born 1953) is a British glass artist. His kiln cast glass pieces are usually combined with Metal, stone, and wood. He established his Gloucestershire studio in 1981 that provides the possibility of heading both private and corporate commissions. He exhibited internationally in museum collections worldwide as well as many private collections (Reid, n.d.).



To honor past and present Australian Service nurses, Robin Moorhouse designed the Australian Nurses War Memorial in 60 glass panels with 25mm thick formed glass (Figure 2-72 and Figure 2-73). The timeline sequence, portraying the history and contribution of Australian Service Nursing by etching and casting glass techniques (Australian Service Nurses National, n.d.). This public glass art has a memorial function to attribute courage, companionship, and fortitude of the Australian nurses.

Another example is the sculptural glass of Australian artist, Warren Langle who commonly applied light art and glass art to his large-scale public art commissions. *Poise* is his glass cast and light sculpture that is installed in 2006 in Melbourne (Figure 2-74) (Langley. n.d.).



Figure 2-72. *Australian Nurses War Memorial*. Designed by Robin Moorhouse. Canberra, Australia. 1999. ©Axolotl Group Pty Ltd 2019.



Figure 2-73. Top view of *Australian Nurses War Memorial*. Canberra, Australia. 1999. ©Axolotl Group Pty Ltd 2019.



Figure 2-74. *Poise*. Warren Langley. Melbourn, Australia. 2006. Dimensions: 6m high x 5m diameter. ©Warren Langley 2020.

### 2.3.14.2 Sand-Casting

Sand-casting is a technique similar to casting metal that the molten glass is poured or ladled directly into a compact sand mold that is formed before (“Sand casting”, n.d.).

One of the masters and pioneers in the use of the sand-casting technique in the glass is Bertil Vallien<sup>67</sup>. He worked for Kosta Boda as a designer, then he divided his time from commercial works and creative pursuits and started working as a freelance artist (Schantz Galleries, 2019). Bertil influenced the graduation of artists while he was teaching in Sweden, the U.K. and at the U.S. institutions where he has taught over the past 30 years (Schantz Galleries, 2019). In his work titled *Boat* (Figure 2-75), a metaphysical boat is created to demonstrate the journey of the soul through and beyond life. “Human figures cross, and circle symbols lend a spiritual undercurrent to these works, which Vallien has called 'dreams of eternal life'” (Schantz Galleries, 2019, p 3). Bertil's sand-casting glass sculptures selected in many public collections such as the Victoria and Albert Museum in London, the Metropolitan Museum of Art in New York, The State Hermitage Museum in St. Petersburg, the National Museum of Art in Tokyo, and The Museum of Fine Art in Montreal (Kosta Boda Art Gallery, n.d.); meanwhile, there are few examples of his glass artworks in public/collective spaces such as Kosta Boda Art Hotel.



Figure 2-75. *Boat*. Bertil Vallien. 4×19.5×2.75 inches. 2018. ©Schantz Galleries.

---

<sup>67</sup> He is a Swedish artist that started to work with clay then moved to Los Angeles to work in a small ceramics company. His interest in glass at that time coincided with the American studio glass movement which encouraged him to think his own ideas in the creation of glass art pieces (Schantz Galleries, 2019).

Sand-casting has an excellent capacity for the execution of public glass art projects. The artist Lee Proctor in collaboration with faculty and students of Linderman school of Kalispell MT. A created a public glass art to unite the Laser and bridge programs (Figure 2-76) (Proctorstudios, n.d.). In this work, they used the sand-casting technique and installed the glass pieces in an iron structure (Figure 2-77).

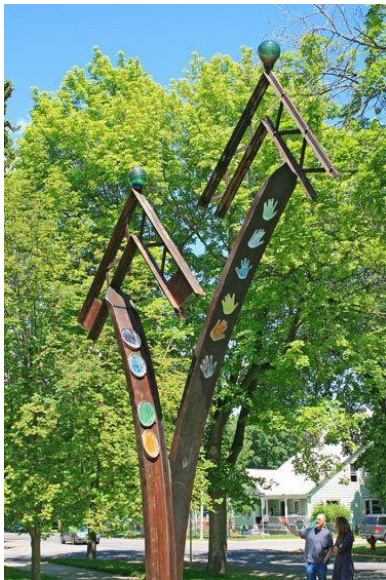


Figure 2-76. Public art for Linderman school of Kalispell. Lee Proctor. Montana, USA. 2014. ©proctorstudios.



Figure 2-77. Sand-casting details. Lee Proctor. Montana, USA. 2014. ©proctorstudios.

## 2.4 Evolution of Modern Technology on Public Glass Art

Using technology in our life is inevitable, while we live surrounded by a different aspect of technology. If this technology is going to be used in public spaces, a responsive system of governance will be required to analyze its reflection and impacts on public space and people (Faghihi, Quintas, & Almeida, 2017 a). Mary Griffiths stated: “Technology is to be put to use democratically in administrative and governance functions for populations, and with populations. A governance approach is useful for analysis of responsive space, where the technology may inflict collateral damage by unforeseen exclusions” (Griffiths, 2016, p. 34). It is true that technology may cause some unexpected damages<sup>68</sup> when it is used in public

---

<sup>68</sup> One of the unexpected damages of technology is mobile phone radiation on DNA and animals which is suggested in recent research (Keykhosravi, Neamatshahi, Mahmoodi, & Navipour, 2018). It is not easy to predict

spaces, but, it is undeniable that technology makes our life easier, trying to provide greater flexibility, changeability, and appreciation for the public's contribution, creates a creative function in public space, and at the end, going further than traditional planning and concept of a public place. In that respect, contemporary artists are often employing more new and contemporary materials, techniques, and technologies, on their conceptual and creative ideas for their artistic projects in public spaces. Technology has been a fundamental force in the development and progress of art. In the digital era, art is still changing due to technology, more than ever before (Gever, 2015). As we see through history, technology always provided artists with new tools. As much as new technologies are available, artists learn to use them to express their ideas. New technologies encourage artists to be more experimental and innovative, even if this becomes a challenge in public art due to the fact that artists want their art to endure, but public spaces demand different strategies – on the preservation of materials and works - than the typically secured atmosphere of art galleries. From the mid-19th century through the 20th century and until today, with the birth of modern science, art changed completely (Gever, 2015). In recent decades we assist to the emerging of new technologies and materials. The following changes alter the way of applying art in public spaces too. Some artists employed new types of art to use in public spaces like performance art, installation art, sound art, street art, and other art expressions. Besides these new generations of arts, there were groups of artists who worked with (what is considered) more 'traditional' arts but twisted it with the use of new techniques.

Among all changes in art in the last decades, sensitive and reactive materials have been paid special attention. Artists used smart materials that can react dynamically to various influences; they are capable of changing their properties by themselves or by external influences such as the effect of light, temperature, force, or an electrical field. These materials are divided into different groups depending on their ability to change their properties or have them changed by external influences. Here we mention some of these smart material groups such as: shape-changing Non-and semi-smart materials, Color and Optically changing Non-and semi-smart materials, Viscosity-changing semi-smart and smart materials, Light-emitting

---

all advantages and disadvantages of a new technology. Usually, it needs research during the time on a technology to check all of its aspects.

Non-and semi-smart materials, Matter-emitting Non-and semi-smart materials, Electricity-generating materials and products, Hybrid materials and products, Nanomaterials and Nano products (Ritter, 2006). In recent year we witness to a great development of innovative systems on producing these compounds that have durability, lightness, stability, energy gathering and also sustainability (Shahinpoor, 2020).

#### **2.4.1 Dichroic Glass**

Dichroic glasses as a material first appeared in a few pieces of Roman glasses from the 4<sup>th</sup> century (Hess, Wight, 2005) but were developed in the 1950s and 1960s by NASA and their contractors, applying extremely thin films of metal by vacuum deposited on a glass surface. These coated glasses protected spacecraft instruments and human vision from the harsh glare of unfiltered sunlight in space and the harmful effects of cosmic radiations. Artistically dichroic glass creates a new high tech art form and coated glass with thin-film metal reflects some wavelength of light and color and produces a chameleon effect (Form, From, & Consumer, 1993). *Prismatica* (Figure 2-78) is a public glass art installation in Montreal, Canada, which is designed by *RAW Design* and won *Luminothérapie*<sup>69</sup> competition for temporary installations in 2015. *Prismatica* is comprised of 50 pivoting prisms, each one more than two meters tall and made of panels laminated with a dichroic film that transmits and reflects every color in the visible spectrum, varying with the position of the light source and the observer. This interactive public art provides the possibility of producing sound by visitors, “As the prisms rotate, a variable-intensity soundtrack comprised of bell sounds will play” (Raw, 2014).

---

<sup>69</sup> *Luminothérapie* is Quebec’s largest competition for temporary installations.





Figure 2-78. *Prismatica* (in daylight and nightlight), RAW design, downtown Montreal, Canada, 2015. ©Photography by James Brittain.

Other examples of dichroic glasses in Sculptural public glass art could be found in works of Ed Carpenter who is famous for his large-scale public art installations and in a wide variety of designs such as architectural sculpture to infrastructure design. He studied architectural glass art in the 1970s under artists in England and Germany (Roots, 2002). In different projects such as *Vessel*<sup>70</sup> (Figure 2-79), *Mesaflora* (Figure 2-80), *Crocus* (Figure 2-81), *Finfan*, Ed Carpenter used dichroic glass because of dichroism's mercurial reflection to "gives the work a feeling of luminous vivacity and a spirit of lightness and optimism. At night, the colorful ensemble glows like a lantern, projecting the spirit of the business school outward in a warm and welcoming gesture" (Carpenter, n.d.).

---

<sup>70</sup> According to Ed Carpenter, the *vessel* "hourly, daily, and seasonal changes in the light and vegetation make the sculpture an abstract sundial as well as symbol of transformation" (Carpenter, n.d.).



Figure 2-79. *Vessel*. Ed Carpenter. Fred Hutchinson Cancer Research Center, Seattle, Washington, United States. 2008. Dimensions: 39' diameter wide x 60' high. Aluminum, stainless steel, laminated dichroic glass, beveled clear plate glass, concrete, and landscape vegetation. ©2002-2019 Ed Carpenter.



Figure 2-80. *Mesaflorescences*. Ed Carpenter. Phoenix AZ Metro Light Rail. United States. 2015. Dimensions: 30' x 10' x 24'. Laminated glass, stainless steel, painted mild steel. ©2002-2019 Ed Carpenter.



Figure 2-81. *Crocus*. Ed Carpenter. City of Taichung, Taiwan. 2016. Dimensions: 72' high x 20' wide. Stainless steel and laminated glass. ©2002-2019 Ed Carpenter.



## 2.4.2 The Recently Invented Glass Technologies

New contemporary technologies in glass art are presented in the following section which is used or could be used in the execution of public art projects: *Luminescent glass*, *glass 3D printer*, *water jet cutting*, and *photovoltaic glass*. The *luminescent glass* was recently used for the creation of glass art objects in small pieces. As many artists are trying to make stunning public artworks with the help of new and contemporary technology, luminescent glass on a big scale can be a good option to choose. Moreover, *Glass 3D printer* is another technique which in the near future can turn creative ideas of glass art into reality. *Water jet cutting* is a cold cutting process that is used for almost any type of material and could be ideal for cutting glass in any type and thickness and for complex forms. *Photovoltaic* is a technology that converts light into electricity while the glass incorporates transparent semiconductor-based photovoltaic cells (solar cells). In this technology, the photovoltaic cells are sandwiched between two layers of glass (Luque, & Hegedus, 2011).

These technologies disclose the use of new knowledge in the close relationship between the scientists and the artists.

### 2.4.2.1 Luminescent Glass

The combination of art and science to create a new way of thinking and work with materials can make big changes in the future of glass art. Teresa Almeida is a Portuguese artist who did practice-based research on luminescence glass and created glass artworks that are, in parallel, with the enhanced science. The objects made by the luminescent glass are colorless under normal lighting conditions (behaving as monochromatic compositions) but their aesthetic values change when exposed to UV light. Several colors can be integrated using the lanthanide oxides, and new harmonious chromatic concepts can be explored (Figure 2-82) (Almeida, 2012 a). Teresa Almeida states:

The artist in order to work with luminescent glass art should understand the specificities of the material, how it works, what influences its intensity and color

and which raw materials can be used for its preparation. Luminescent glass is a colorless glass under daylight and emits different colors under the ultraviolet light according to the different lanthanide oxide introduced. The emission of light with different colors under ultraviolet radiation (wavelength ca. 380 nm) is achieved by adding rare-earth oxides to the glass raw materials such as: europium ( $\text{Eu}_2\text{O}_3$ ) that gives a red color, terbium ( $\text{Tb}_2\text{O}_3$ ), green color; cerium ( $\text{CeO}_2$ ), blue; dysprosium ( $\text{Dy}_2\text{O}_3$ ), yellow; thulium ( $\text{Tm}_2\text{O}_3$ ), violet and 3,78% (w/w) samarium ( $\text{Sm}_2\text{O}_3$ ) an orange color (Almeida, 2012 a, p. 2).

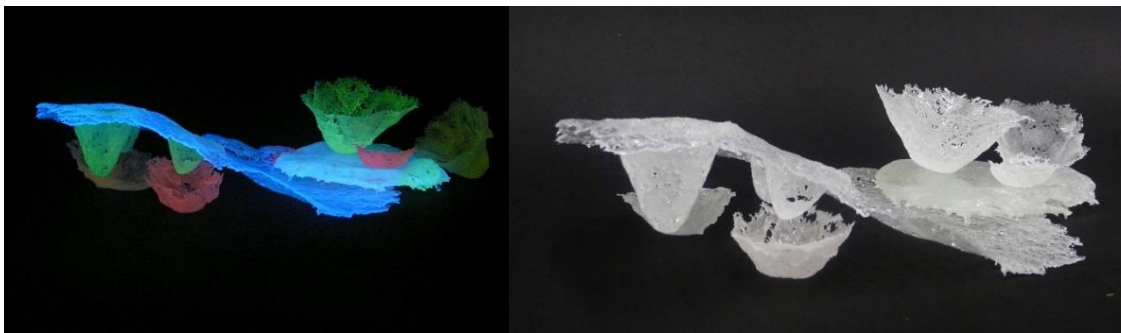


Figure 2-82. *Subtle movements of the corals in the Blue ocean II* (under daylight and ultraviolet light), Teresa Almeida. 2008. ©Teresa Almeida.

Several fluorescent materials, also designated as smart materials (Ritter, 2006), have been explored by artists to be integrated into architecture, design objects, and artworks. Luminescent glass can be considered a “smart material”.

The light changes the formal composition of the pieces presented with luminescent glass, it alters its color. This change alteration of light raises the inquisitiveness of the observer: the visualization of the piece in its two distinct forms, the monochromatic colorless and the lightning colorful (Almeida, 2012 a).

Besides luminescent glass, luminescent enamels were also studied (Almeida, 2011) and recently new luminescent zeolite enamels are being developed to be applied on the glass surface. These products have potential applications, such as use in design, lighting devices, luminescent solar concentrators (Laia and Ruivo 2019) can be used in public glass art. and are starting to be apply in Art works (Rocha et all, 2020)

### 2.4.2.2 Glass 3D Printer

During the Industrial Revolution, developments in manufacturing allowed extensive use of glass in houses and household objects. However, manufacturing procedures for complex geometry and custom glass objects remained elusive (Inamura, Stern, Lizardo, Houk, & Oxman, 2018).

Mediated Matter Group in collaboration with MIT's Department of Mechanical Engineering and MIT's Glass Lab and additional researchers studied and developed an optically transparent glass printing process called G3DP. The printer is composed of scalable modular elements able to operate at the high temperatures required to process glass from a molten state to an annealed product. This molten glass 3D printer demonstrates the production of parts that are highly repeatable, enable light transmission, and resemble the visual and mechanical performance of glass constructs that are conventionally obtained (Keating, Gariboldi, Patrick, Sharma, Kong, & Oxman, 2016). Figure 2-83 shows an example of this technique.

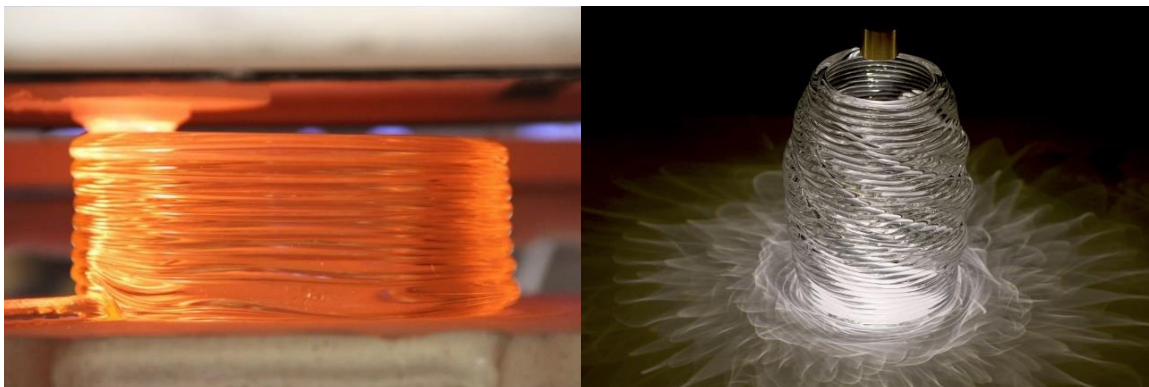


Figure 2-83. Glass 3D printing process. ©Photo: Steven Keating (left), and Caustic patterns of a 3D printed glass structure. Photo: Chikara Inamura (right).

We believe that a 3D glass printer might be used for the creation of imaginative ideas for public art sculptures. Although researchers have just started to expand their research on 3D glass printer and the artists are not yet familiar with the operation of this device, but its potentialities will make it popular among glass artists quickly. This new device may be used instead of glass kilns in the future as artists can create complex novel objects easily by 3D

glass printers. Currently, there is a limitation on the size and scale of the final products of 3D glass printer objects due to its inability to handle materials that require a high melting point. There is a direct relation between the size of the annealing chamber and printed glass objects, which currently measure 250 x 250 x 300 mm (9.8 x 9.8 x 11.8 in) (Anderson, 2015). However, we believe with more time and research, most obstacles about the size and scale limitations would be surpassed.

#### **2.4.2.3 Water Jet**

The manual cutting of shapes (significantly cutting complex curves and right angles) is challenging and time-consuming. The water jet machine makes the cutting process cheaper, easier, and open up new possibilities for complex forms. It is ideal for mapping and generating negative and positive space.

A water-jet cutter is a machine that cuts a wide range of materials using a high-pressure jet of water or a mixture of water and an abrasive substance (Overview of waterjets, n.d.). CNC<sup>71</sup> system is used to control the reliably cutting of the water-jet cutter; depends on the type of the machine, the software<sup>72</sup> comes with the machine (Overview of waterjets, n.d.).

Robert Knottenbelt (Figure 2-84) is a pioneer artist who used water-jet cutting technology for his glass practice in 1986 (Doolan, 2012). For example, Vanessa Cutler is another artist, educator, and consultant in waterjet for both creative and industrial sectors, who has helped many artists to apply the technology into their work. She likes to explore the application of traditional practice and industrial processes in the creation of glass artworks. Her book 'New Technologies in Glass'<sup>73</sup> was published in 2012 that gives an artist's perspective on new techniques, machinery, and software in a glass.

*Liverpool Map* (Figure 2-85) by Inge Panneels and Jeffrey Sarmiento is installed in the Museum of Liverpool is a good example of combining technology with techniques such as screen printing, kiln forming, fusing, and water-jet cutting. The complex forms were cut,

---

<sup>71</sup> CNC is refer to computer numerical control (CNC) which is the automated control of machining tools.

<sup>72</sup> It can be IGEMS or LANTEK or other software, but the machine just reads CNC codes (Overview of waterjets, n.d.)

<sup>73</sup> This book is helpful for the artists wishing to expand their toolkit and to know better the possibilities of the medium.

slotted together, and fused and became a single sheet of glass. Then, in the end, the sculpture polished to form the edges and to have a soothing view (the cold-work process lasted 20 full days for the six columns). This work consists of 6 columns, each weighing 100kg and containing 17 layers of glass, 225×33 ×5 cm. For this work, the artists used the geographical mapping of the Mersey River, roads, rail, and municipal boundaries; as well as, images of landmarks and cultural icons, and the handwriting of actual people, their memories, emotions and, opinions about their home city (Sarmiento, 2011). Liverpool map is a public glass sculpture which is a literal representation of the city that included culture, identity, and the historical origins of the city besides a successful combination of old and new techniques and technology together.



Figure 2-84. *Tower Zero, No.1* of The Satellite series. Robert Knottenbelt. CAD/CAM- designed glass, water-jet cut, sandblasted, acid-polished, silicon glues, 61×42×1.2 cm1991. Photo: Terence Bogue.



Figure 2-85. *Liverpool Map*. Inge Panneels and Jeffrey Sarmiento. 2011. Museum of Liverpool, UK.

#### 2.4.2.4 Photovoltaic Glass

Photovoltaic is a technology that provides the possibility of the conversion of light into electricity. The electricity generated through *photovoltaic cells*<sup>74</sup> (Figure 2-86) is called green or clean electricity as its source is renewable, it is energy cost-saving, and its production and consumption do not cause pollution.



Figure 2-86. A crystalline silicon solar cell.

Luque, & Hegedus (2011) in Handbook of Photovoltaic Science and Engineering explained the advantages and disadvantages of photovoltaics:

Advantages: "... it is widely accessible and essentially infinite; it does not contribute perceptibly to global climate change or air/water pollution; ... solar cells never need recharging like a battery. Some have been in continuous outdoor operation on Earth or in space for over 30 years".

Disadvantages: "sunlight is a relatively low-density energy; high initial (installed) cost; unpredictable hourly or daily output; lack of efficient energy storage".

Although every technology has its advantages and disadvantages, photovoltaic technology has a long way to be improved while it is used since the 1990s and was first mass-produced in 2000 in Germany (Palz, 2013). Using the technology of energy-producing in the creation of artwork has multi-functional benefits. It has environmental benefits as well as creating artwork with creativity and novelty.

---

<sup>74</sup> Photovoltaic cell or Solar cell is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect, which is a physical and chemical phenomenon (Böer, n.d.).



Sara Hall is an international artist who is known for her works on solar and big scale glass art projects. *Lux Nova* (Figure 2-87) is a glass art installed on a forty-foot-high wind tower (True North Tower) on the top of the underground library at Regent College in Vancouver. This is an example of photovoltaic architectural public glass art. It collects solar energy to illuminate the tower and park at night. This work is a collaboration between Clive Grout, Walter Francl Architects, and Sarah Hall as a glass artist (Regent College, n.d.).

For designing this work Sarah used deep-blue silicon crystal photovoltaic cells in irregular arrangements. Hall created a background layer etched a prayer with an ancient Aramaic script to reference the sacred texts kept in the library below (Figure 2-88) (Cockram, 2012).



Figure 2-87. *Lux Nova*. Sarah Hall. 2007. Wind tower Regent College, Vancouver, Canada. ©Stained Glass Peters GmbH.

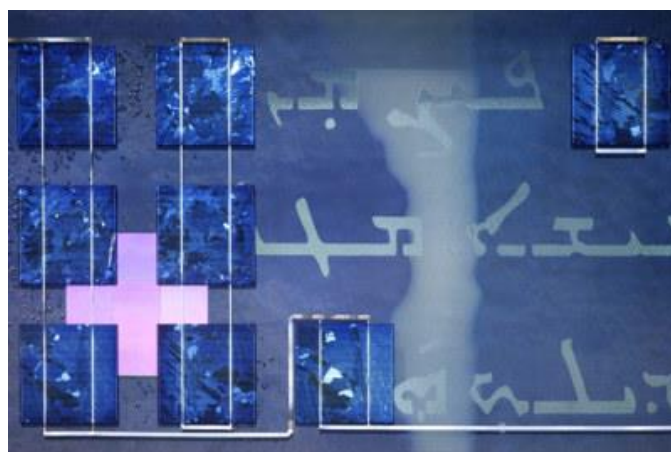


Figure 2-88. *Lux Nova*. Sarah Hall. 2007. Details of the cross and Aramaic script. Wind tower Regent College, Vancouver, Canada. ©Sarah Hall Studio.

# Chapter 3: The History and The Current State of Glass Art in Portugal, Iran, and Great Britain

## 3.1 Three Perspectives: Portugal, Iran, and Great Britain

Living in the 21<sup>st</sup> century without glass in our living areas is almost unthinkable. Glass can be seen everywhere; in the buildings, in all the transportation vehicles, in homeware equipment, in scientific laboratories' supplies. It is quite difficult to imagine our life without the benefits of glass, and without the light and the protection, it brings. Elizabeth Morris in her book called *Stained and decorative glass* stated: "Natural glass is as old as the universe and the use of glass in the building goes back to Roman times..." (Morris 1988, p. 8). Based on the latest archeological excavations, the oldest use of glass in buildings dating back to 2.500 BC in Tchogha Zanbil Ziggurat in Iran (Figure 3-44). Although this research does not investigate the history of glassmaking or the history of architectural glass, a brief history of glassmaking could be of assistance in finding the way that glass has come so far.

The reasons for choosing these countries in this thesis are presented in the introduction<sup>75</sup>. In this chapter, a brief history of glass art and a succinct investigation of the current and recent state of glass art in Portugal, Iran, and Great Britain, are addressed. Moreover, the public glass art of Portugal, Iran, and Great Britain is studied.

The works of Joana Vasconcelos, and José Pedro Croft as Portuguese artists whose glass artworks were installed in public space, are presented. A few examples of the contemporary use of glass art in public spaces of Iran are reviewed. Examples of public glass art of Andrew Moor association and some of the glass artists such as Graham Jones, Danny Lane, and Kirsty Brooks, Brian Clarke, David Pearl, and Amber Hiscott, are provided.

---

<sup>75</sup> Please refer to Introduction of the thesis in Motivation section.

### 3.2 A Brief History of Glass Art and Public Glass Art in Portugal

Portugal has a long history of glass tradition, especially on stained glass and industrial glass blowing. However, artists were never really included in this tradition, being deemed as artisans. Only during the 20th century, we witnessed a valorization of this specific field of art, with more and more artists working with glass, paving the path to the introduction of designers in the glass industry (Almeida, 2011, 2020 b).

Since the time of Romanization and the Arab occupation, glass has been used in the Iberian Peninsula. However, there is no actual proof that local glass production existed in Portugal before the end of the 15<sup>th</sup> century. There is only evidence of the existence of small furnaces in the region of Lisbon until the mid-18<sup>th</sup> century, in Ribatejo and along the coast, between Palmela and Porto while because of a major earthquake in 1755 in Lisbon and other cities of Portugal, many glass objects were destroyed (Coutinho, 2016).

The history of glass blowing in Portugal dates back to the 15<sup>th</sup> -16<sup>th</sup> century, with the Covo factory located in Oliveira de Azeméis (Aveiro, central Portugal). Covo's contribution was of great importance for the development of the glass blowing industry, and it labored until the 20th century. However, the most well-known factory of glass blowing production was the Coima Factory. It began its glass production in 1719 in Barreiro, near Lisbon, and in 1748, the Irish John Beare moved the factory to Marinha Grande (near Leiria) (Almeida, 2011, 2020 b).

In 1954 there was a school factory *Fábrica Escola Irmãos Stephens* [FEIS] (School Factory of the Stephens Brothers), where the industrial component was combined with a school for glassblowers. In 1992 the board of directors declared bankruptcy and closed its doors to glass production (Almeida, 2020 b).

Marinha Grande is a famous city in Portugal known as *the land of glass* or *glass city*, owing to this visibility to the concentration of many glass factories in this area. Until the mid-1920s, Marinha Grande had about 30 factories which were the result of several glass expert workers and technicians. Later in the mid-1950's the number of factories reduced to about twenty factories. Then the production capacity increased and the glass industry improved with the mechanization and automation of some sectors (Almeida, 2018 a). Still, Marinha Grande is the largest and most important center of glass production in Portugal. Despite the

disappearance of the crystal sector, there are very few factories laboring nowadays, due to the lack of investment in new equipment and technologies and several economic and social crises in Portugal (Almeida, 2018 a). Moreover, glass blowing is much associated with poverty and low wages, so youths just want to try new opportunities in larger cities. Therefore, it is economically prohibitive for glassblowers to work and produce glassware as they used to do in older times when the Portuguese market had protective laws. With the European Community market wide open, Portugal has to compete with other countries with great glass tradition and more attractive designs, like Finland, Sweden, Germany, or the Czech Republic.

In 1999, a governmental program was created to help the glass factories. Therefore, a project called *MGLASS* started to be implemented. The aim was to change the production objectives and commercial targets of the region factories and to increase the quality of their products and promote Portuguese design abroad. Twenty companies joined this initiative, hiring young designers and inviting established Portuguese designers to participate. *MGLASS*, in order to promote its products also invited famous designers, such as Karim Rashid, Jonathan Arder, and Klein Reid. The glass objects made by those designers would be a major advert in the international fairs, and major publicity campaigns were held in the USA, France, England, Spain, Italy, Germany, and Brazil to endorse the product (Almeida, 2020 b).

In the conference, *European Glass Context 2008* Avelino Sousa Lopes, the director of CRISFORM<sup>76</sup> (a training center for glass located in the industrial area of Marinha Grande), explained why the project fails its goals. In his opinion, the factories and industry owners never understood the significance and objectives of the project, while even those few that understood never believed that their partners would ever be able to concretize it (Almeida, 2010).

CRISFORM supported many designers with innovative projects and offered short courses for students of the Fine Arts University in Porto (FBAUP) and Escola Superior de Design in

---

<sup>76</sup> CRISFORM was a non-profit training center with administrative and financial autonomy, created in 2000 and operated in the new building from 2005 to 2011, provided exceptional training and other activities for the glass sector, workshops with international artists, demonstration with mestre vidreiros. Crisfrom supported many designers with innovative projects, with the economic difficulties of the country, CRISFORM closed in 2011. Luckily in the same year, Cencal (institution for ceramic training) took over the facilities carrying on with some glass programs and continuing with the protocols and workshops (Almeida, 2011).

Caldas da Rainha (ESAD). For example, CIRSFORM supported artists such as Bert Holvast<sup>77</sup>, Barbara Walraven<sup>78 79</sup>, and Susana Soares. The project that Susana Soares created “consists in a series of alternative diagnostic tools that uses bees to diagnose accurately at an early stage of a vast variety of diseases” (Soares, n.d.) (Figure 3-1).



Figure 3-1. *Bee's / Project*. Susana Soares. 2007-2009. © 2011 Susana Soares.

The courses in CRISFORM were free of charge for the students. The collaboration between FBAUP and CRISFORM started in 2009 and from that period, we saw an increase of exhibitions and projects, as well as a closer collaboration between the FBAUP and Fine Arts University in Lisbon (FBAUL) leading to an increased interest of students in learning glass art. CRISFORM closed in 2011 due to several economic crises endured by the country. Luckily, in the same year, CENCAL (institution for ceramic training) took over the facilities carrying on with some glass programs and continuing with the protocols and workshops (Almeida, 2012 b).

To further understanding the function of CENCAL, an interview was conducted with Joana Silva (Silva, personal communication, 24 May, 2017). Joana was trained in CRISFORM and now works at CENCAL, conceiving new glass courses not only for the glass students but also for everyone who wants to learn how to work with this material. She states that CENCAL is the

---

<sup>77</sup> Bert Holvast is a dutch artist born in 1953 in Wedde, Netherlands. He moved to Portugal from his native country. He studied between 1977 and 1981 in the locations of Den Bosch and Breda. Just one year after he finished his courses, he won the European Prize (Oostende, Belgium) for his solo exhibition.

<sup>78</sup> Barbara Walraven is a Dutch artist who was born in Argentin in 1956. She studied in Breda, Netherlands. She has lived and worked for 15 years in Castelo de Vide (Portugal).

<sup>79</sup> They (Bert and Barbara) come from Netherlands to Portugal more than 25 years ago and did several exhibitions in relation their works not only in galleries but also in public and collective space in Portugal (Almeida, 2013 b).

only training glass center in Portugal that runs different workshops such as Glass blowing, Kiln-Casting (Casting and *Pâte-de-Verre*), Fusing, Slumping, Flame-working, Tiffany and Traditional Stained Glass, Engraving, Lapidating, Cold work, and Painting. Training at CENCAL is free for students and provides a great opportunity for them to learn and develop their projects. Joana also claims the economic crises have affected the number of participants because the budget of CENCAL has decreased and could not support the trainers as much as before.

Besides all ups and downs in the implementation and improvement of the glass industry and glassworks in Portugal throughout the centuries, stained glass design in Portuguese churches is remarkable. The first example of stained glass windows in Portugal date from the 15<sup>th</sup> century and are display in Santa Maria de Vitória Monastery in Batalha (Redol, 2003). However, it was at the beginning of the XX century that we assist to an increase of works, and the emerge of traditional workshops as Ricardo Leone studio in 1904 in Lisbon, and Antunes in 1906 in Porto. The first labor until 1971 and the second is still in function (Almeida, 2011).

One of the significant works of stained glass in Portugal is the windows of the Church of Nossa Senhora de Fátima in Lisbon, in 1934-38 which was executed by Almada Negreiros (Figure 3-2). Almada Negreiros belongs to the generation of artists who introduced modernism to Portugal. Not only his paintings but also his ceramics, tapestry, mosaic, and stained glass were unique (Almeida, 2011).

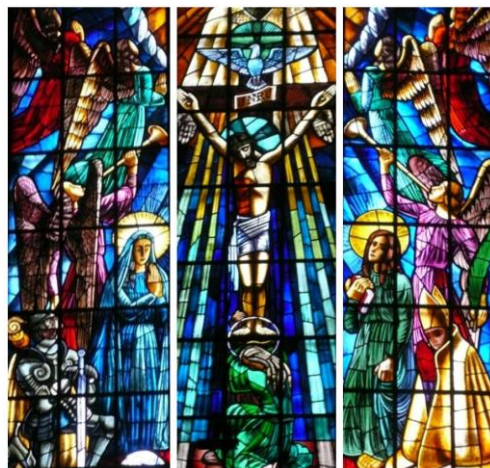


Figure 3-2. The stained glass window of the Nossa Senhora de Fátima Church, Lisbon. Almada Negreiros. 1934-38. The three stained glass windows are installed on the main façade. ©Teresa Almeida.

Some examples of Portuguese stained glass in Portugal can be given such as: *Virgin of the see*<sup>80</sup> from Abel Manta in Jerónimos monastery; *stained glass of Lisbon Cathedral*<sup>81</sup>, *Solar of the Porto Wine*<sup>82</sup>, *Chapel Seminary, Soutelo* in Braga<sup>83</sup>, *Paços dos Duques de Bragança*<sup>84</sup>, *stained Glass of the Fafe Court*<sup>85</sup>, *Chapel of Carmelita Convent*<sup>86</sup>, *Lapa Church* in Porto<sup>87</sup>, *Sanctuary of Santo António de Vale de Cambra*<sup>88</sup>, *Church of São Martinho de Cedofeita* in Porto<sup>89</sup>, and *Sagrada Família Church* in Chaves<sup>90</sup> (Figure 3-3) (Almeida, 2011). All of these examples demonstrate the importance of glass art in Portugal and the extent of people's interest in it.

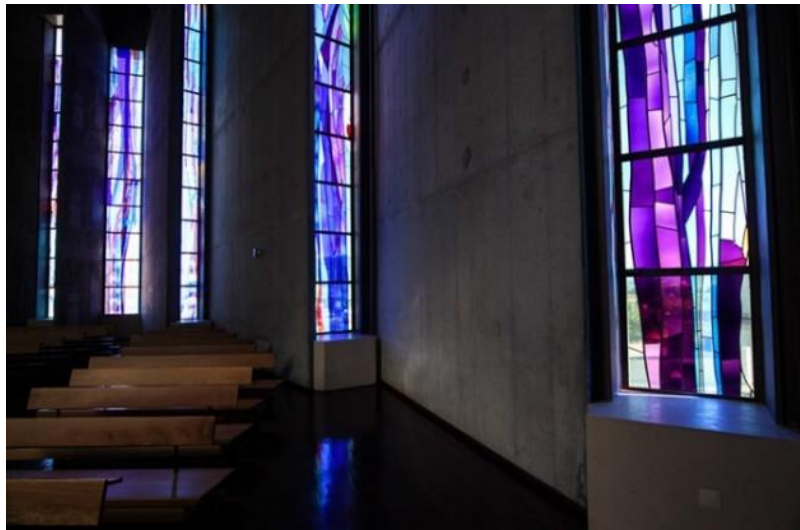


Figure 3-3. Stained Glass windows of Igreja da Sagrada Família. Francisco Laranjo. Chaves, Portugal. 2008. © Francisco Laranjo.

<sup>80</sup> 'Virgem do Mar /Virgin of the see' in Jerónimos Monastery in Lisbon executed by Abel Manta in 1936.

<sup>81</sup> Vitral na Sé de Lisboa/ Stained glass of the Lisbon Cathedral executed by Jorge Barradas in 1940.

<sup>82</sup> Vitral do Solar do Vinho do Porto, executed by Lino António in 1945 in Régua.

<sup>83</sup> Vitral da Capela do Seminário de Soutelo/ Stained Glass of the Chapel of the Seminary of Soutelo, Braga executed by Manuel Lapa in 1958.

<sup>84</sup> Vitrais dos Paços dos duques de Bragança/ Stained glass windows of the Paços dos Duques de Bragança in Guimarães executed by António Lino in 1959.

<sup>85</sup> Vitral do Tribunal/ Stained Glass of the Fafe Court executed by António Coelho Figueiredo in 1968.

<sup>86</sup> Vitral da Capela do convento das Carmelitas/ Stained glass of the Chapel of the Convent of Carmelitas, Patação executed by José Rodrigues in 1981.

<sup>87</sup> Vitral da Igreja da Lapa/ Stained glass windows of the Lapa Church, Porto executed by Manuel De Francesco in 1993.

<sup>88</sup> Stained glass window of the Sanctuary of Santo António de Vale de Cambra executed by Domingos Pinho in 1993.

<sup>89</sup> Stained glass window of the Church of São Martinho de Cedofeita, Porto executed by Júlio Resende, Manuel Casal Aguiar and Francisco Laranjo in 1996.

<sup>90</sup> Stained glass windows of the Sagrada Família Church, Chaves executed by Francisco Laranjo in 2008.



### 3.3 The Current State of Glass Art and Public Glass Art in Portugal

With the background of glass blowing and stained glass in Portugal, currently, glass art in Portugal is a growing trend as we are witnessing an increasing number of places that offer glass art education. Glass art education in Portugal is offered in the art University of Porto (Faculdade de Belas Artes da Universidade do Porto - FBAUP); University of Lisbon (Faculdade de Belas Artes da Universidade de Lisboa- FBAUL); VICARTE from Faculty of Science and Technology of NOVA University of Lisbon (FCT-NOVA) and FBAUL; Cencal; Superior school of art and design in Caldas de Rainha (Escola Superior de Design in Caldas da Rainha), and Superior school of Education in Viana do Castelo (Escola Superior de Educação).<sup>91</sup>

There are glass artists in Portugal that create original glass arts. In addition, there is a group of glass artists who collaborate with chemistry scientists in VICARTE, working on producing luminescent glass materials that are activated in dark under UV light (Please see chapter 2.4.1.1).

The glass museum of Marinha Grande plays an important role in preserving and introducing Portuguese glass art from the past to the present. Marinha Grande glass museum (Museu do Vidro) opened in 1998 in Stephens Palace, the old house of Guillerme Stephens which was built in the 18<sup>th</sup> century (1770) with neoclassical style (Figure 3-4). This museum exhibits glass pieces from the 17th century until nowadays. Tools for glass manufacture, machinery and molds are on display, showing the evolution of the glass industry in Portugal (especially in Marinha Grande) (Figure 3-5). In 2013, the glass museum of Marinha Grande opened a new building to host contemporary art (Figure 3-6) with an exhibition entitled '*Glass seen through feminine eyes*'. This exhibition intended to show women works of 15 artists and was dedicated to the women who have chosen glass as material/concept for their Works (Almeida, 2013 a).

This space is a glass building, divided into three open floors (Figure 3-6). The ground floor is reception for the visitors and nowadays short temporary exhibitions are held. The top floor is the permanent collection of contemporary glass. The second floor is for larger temporary exhibitions, and this is where *Glass seen through feminine eyes* exhibition took place (Figure

---

<sup>91</sup> The glass art education in Portugal is more investigated in chapter 4.3.1.

3-7). (Almeida, 2018 a). The museum provides temporary exhibitions every year, with guide tours and children activities.



Figure 3-4. Outside of Glass Museum of Marinha Grande. Portugal. ©<https://www.cm-mgrande.pt>



Figure 3-5. Inside of Glass Museum of Marinha Grande. Portugal. Permanent exhibition. ©<https://www.cm-mgrande.pt>



Figure 3-6. Outside of Glass Museum of Marinha Grande for contemporary exhibitions. Portugal.  
©atelier XYZ.



Figure 3-7. Inside of Glass Museum of Marinha Grande. Portugal. Temporary exhibition. This image shows the Glass seen through feminine eyes exhibition in Marinha Grande Glass Museum from October 19, 2013 until April 2014. ©Teresa Almeida.

In the 21<sup>st</sup> century, glass art is promoted in Portugal in parallel with the development of science and technology, glass art education, glass art exhibitions, and interactions between designers and craftsmen in projects such as MGLASS. Different artists made glass artworks for public spaces such as Joana Vasconcelos, Jose Pedro Croft, and Conceição Cabral.

In CRISFORM building (now CENCAL building), glass artworks of Barbara Walraven (Figure 3-8) and a glass sculpture of Teresa Almeida (Figure 3-9) are on display. To create these artworks, these artists used CRISFORM facilities and specialized technical assistance. In the Marinha Grande Glass Museum, there is an installation by Klaus U. Hilsbecher which was produced with recycled steel and was installed in the back entrance (Figure 3-10), and Pablo Pizarro's sculpture in the yard. These works are some examples of glass art in public and collective space in Portugal.

Klaus U. Hilsbecher<sup>92</sup> is a German artist who has chosen music, architecture, and glass sculpture as his main artistic expression. The idea of his installation in the Marinha Grande glass museum (Figure 3-10) came from the handmade shellfish trap built by Lagos fishermen which calls *Murjonas* (Hilsbecher, 2017). This work was first exhibited in 2015 in Venice, and since 2017 was installed in the Marinha Grande museum. This is a very important piece for the region because it was made in Portugal. The *Murjonas* have elegant forms and their shadows are like fine drawings. Klaus stated: "my intention is to preserve these national items transformed into art" (Hilsbecher, 2017).

Pablo Pizarro's<sup>93</sup> sculpture (Figure 3-11) is intuitive and conceptual. He used glass as a symbol of the ocean's water, and steel as a boat trip. With this work, the artist wanted to simultaneously take us on a journey and remind us of a long maritime and discovery tradition of the place (Carvalho, 2014). In the following sections 3.3.1, 3.3.2, and 3.3.3 case studies of glass art in public spaces in Portugal are addressed. The sculptural public glass art of Joana Vasconcelos - as a Portuguese artist whose public art projects and sculptural public glass art are known in Portugal -, is studied in section 3.3.1. The example of the public glass art of José

---

<sup>92</sup> Klaus U. Hilsbecher (1949) was born in Wuppertal Geboren, Germany. His artworks were exhibited in glass museum and private collections around the world (Hilsbecher, 2017).

<sup>93</sup> Pablo Pizarro Medina (1969) was born in Madrid, Spain. He studied engineering at the University of Politecnica in Madrid. In 1996 he attended the Ceramic workshop for sculpture and murals of Marta Ugarte where he experiments plastic and sculptural possibilities of recycled glass. since 2000 he has been collaborating with Spanish and international artists in creative and exhibiting projects (Carvalho, 2014).

Pedro Croft is addressed in section 3.3.2, and the example of Conceição Cabral's glass art in public spaces is addressed in section 3.3.3.



Figure 3-8. Worst case senario: under the water. Barbara Walraven. Cencal building, Marinha Grande, Portugal.  
©Teresa Almeida.



Figure 3-9. Teresa Almeida. Cencal building, Marinha Grande, Portugal.  
©Teresa Almeida.



Figure 3-10. *Murjonas*. Klaus U. Hilsbecher. Back entrance of Glass Museum of Marinha grande, Portugal. Installed in 2017. ©Teresa Almeida.



Figure 3-11. *Escape y Quietud*. Plabo Pizarro. Glass Museum of Marinha grande, Portugal. 2011. 255x70x30 cm. ©Teresa Almeida.



### 3.3.1 Joana Vasconcelos

Joana Vasconcelos is a Portuguese artist who was born in December 8, 1971 in Paris, France. She is currently living and working in Lisbon, Portugal. She has exhibited regularly since the mid-1990s. After she participated in the 51st International Art Exhibition – Venice Biennale (la Biennale di Venezia) in 2005, her work became known internationally. She was the first woman and the youngest artist to exhibit at the Palace of Versailles, in 2012 (Vasconcelos, n.d.). Vasconcelos participated in numerous solo and group exhibitions around the world and her work has been featured in many books. Much of Joana's works deal with feminism, as well as social and political issues (Vasconcelos, n.d.). I visited Joana Vasconcelos atelier on the 7<sup>th</sup> of November 2018. She has a very large atelier in Lisbon near the Orient Museum (Lisbon), where about 40 people work under Joana Vasconcelos's supervision to execute and carry out Joana's creative ideas in the projects. There were various materials in her studio (Figure 3-12, Figure 3-13, Figure 3-14, Figure 3-22, Figure 3-23, Figure 3-24), ranging from different texture and colors of fabrics, buttons, lacing, to wires, ceramic sculptures, embroideries in different sizes and colors. There were also 3D maquettes of projects in progress (Figure 3-18, Figure 3-19, Figure 3-20, Figure 3-21) and also a storage for the pre-exhibited artworks (Figure 3-17 and Figure 3-27). In addition, there were several sections in her atelier such as sewing, embroidery, electricity, ceramics, drawing, computing and architecting, assembling and many more (Figure 3-15, Figure 3-16, Figure 3-26, Figure 3-25, Figure 3-28, Figure 3-29). In each section, there were 3-4 (more or less) people working on Joana's project. She also had a scheduling assistant who managed and reminded her every day's timetable and appointments. In her atelier, everything was well organized in an orderly and effectively way. There was space for yoga/meditation as well as a refectory to prepare the employees' meals.



Figure 3-12. Picture A. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-13. Picture B. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-14. Picture C. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.

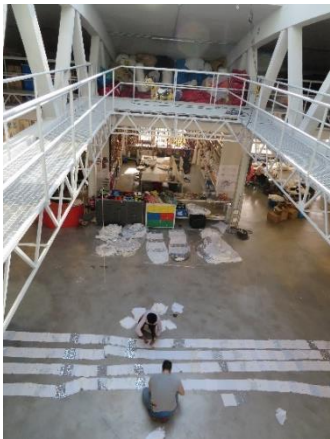


Figure 3-15. Picture D. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-16. Coeur de paris piece in process. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-17. Picture E. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-18. Maquette Of I'll Be Your Mirror. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-19. Maquette of Solitaire. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.





Figure 3-20. Maquette of Gateway (A). Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-21. Maquette of Gateway (B). Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-22. Picture F. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-23. Picture G. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-24. Picture H. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-25. Picture I. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-26. Picture J. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-27. Picture K. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-28. Picture L. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.



Figure 3-29. Picture M. Atelier of Joana Vasconcelos. Lisbon, Portugal. ©Parinaz Faghihi.

Trying to understand the importance of this successful artist, an interview was conducted with Joana Vasconcelos when I visited her atelier on 7 November 2018 (Vasconcelos, personal communication, 7 November, 2018) to ask some questions about her background, education, artworks, and projects. She stated that she studied in the school of art (António Arroio) in Lisbon, then took her courses in a private school of arts in Lisbon where she studied jewelry and drawing for about 6 years. She also took courses in ceramics, glass, and experimented crafts and technology in all of the studios of the school. It was not surprising to see such range and confidence in the use of materials in her artworks in regard to schooling and her college experience.

Among all of her artworks in private, collective, and public spaces, glass can be seen as one of the materials to characterize her conceptual ideas. *Nectar* (Figure 3-30), in the Berardo



Collection Museum, Lisbon, is a glass sculpture that was designed and installed in 2006 by Joana Vasconcelos (Amado, Lebovici, ZAYA, 2010). This is a vertical structure with green bottles, belongs to the Candlesticks series which later the artist presented Message in a Bottle (Figure 3-31) with Sake bottles in 2006 in Tokamachi, Japan from the same series. The latest work of this series is Blue Champagne (Figure 3-32) for the gardens of the Palace of Versailles in France which was created with champagne bottles.



Figure 3-30. *Nectar*. Joana Vasconcelos. Berardo Collection Museum, Lisbon, Portugal. 2006. 720 x Ø 350 cm ©Joana Vasconcelos.

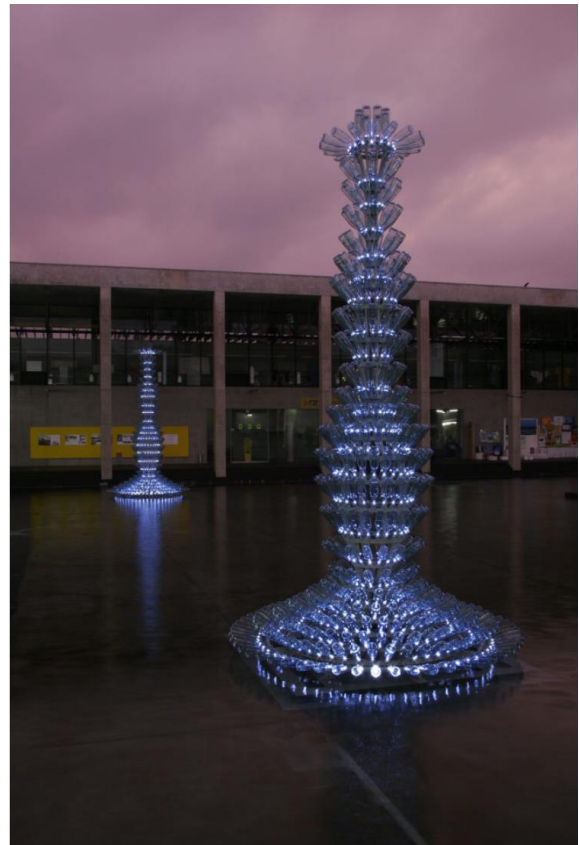


Figure 3-31. *Message in a Bottle*. Joana Vasconcelos. Echigo-Tsumari Art Triennial, several locations, Tokamachi, Japan. 2006. (2x) 650 x Ø 350 cm. ©Joana Vasconcelos.



Figure 3-32. *Blue Champagne*. Joana Vasconcelos. Château de Versailles, Versailles, France. 2012. (2x) 940 x Ø 496 cm. ©Joana Vasconcelos.

All of the aforementioned sculptural public glass arts are installed in outdoor collective spaces that are protected by the security guard to make this glasswork safe from vandals. In each work of the Candlesticks series, Joanna used the repetition of a symbolic object that has been relevant to the sculpture implementation and geographical location, namely the cultural, historic and social aspects. For example, *Message in a Bottle* in Japan, she used sake bottles while in Portugal she used beer bottles, and in France Champagne bottles. It is common for Joana to present new artistic artifacts with eye-familiar items repetition. Glass bottles in the Candlesticks series and *I'll Be Your Mirror #1* (Figure 3-33, Figure 3-34) are examples.

Another of her artwork is *Solitário (Solitaire)* where the repetition of ordinary objects creates a new concept. In this public art 18 light-alloy golden wheel rims, crystal whiskey glasses, metalized and thermo-lacquered iron, stainless steel, tempered, and laminated glass are used (Figure 3-35).



Figure 3-33. *I'll Be Your Mirror #1*. Joana Vasconcelos. San Clemente Palace Kempinski, Isola di San Clemente, Venice. Bronze, mirrors. 356 x 682 x 537 cm, Berardo collection. 2019. ©Joana Vasconcelos.



Figure 3-34. Details of *I'll Be Your Mirror #1*.  
©Joana Vasconcelos.

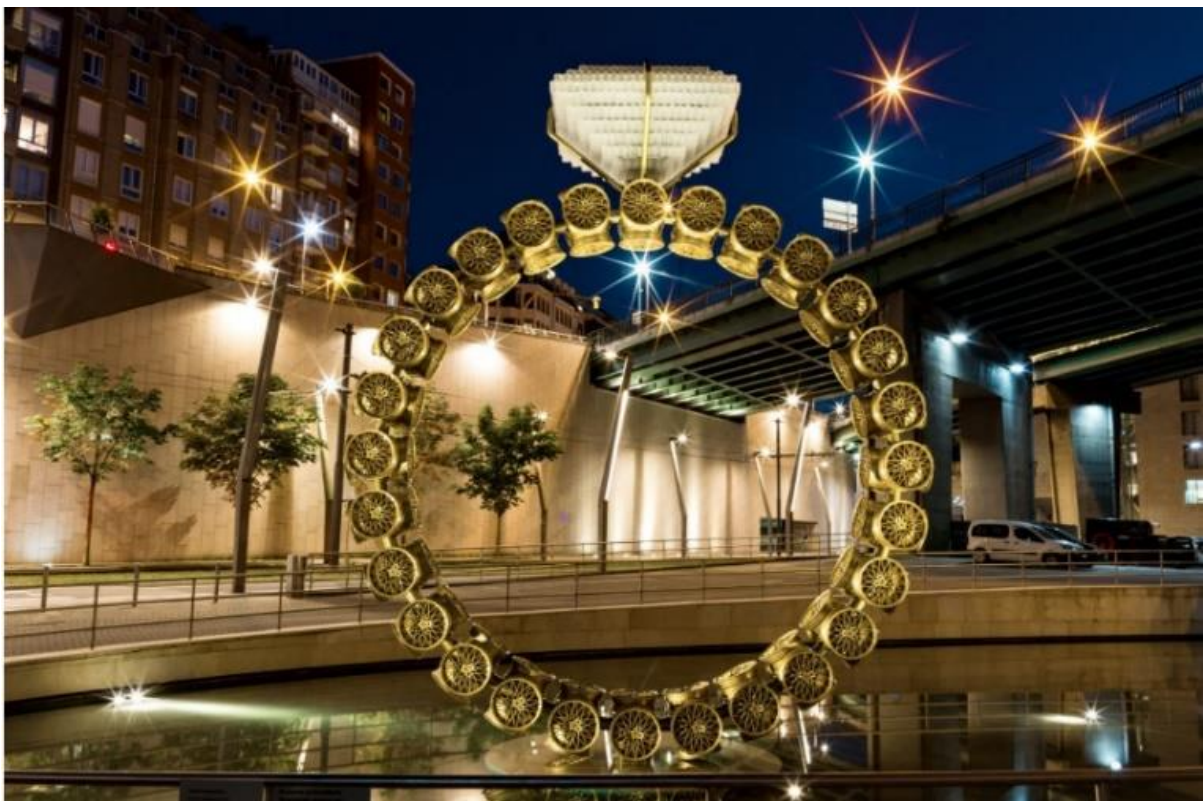


Figure 3-35. *Solitaire*. Joana Vasconcelos. Collection of the artist. 2018. 720 x 604 x 209 cm. ©Joana Vasconcelos.



She has also used traditional symbolic crafts of Portugal such as crochet to cover *Rafael Bordalo Pinheiro's*<sup>94</sup> animal-shaped faience figures (Figure 3-36) not as a second-skin, but as a new reading of meaning (Cabral, 2013). She tried to create new meaning in a paradoxical context through eye-familiar objects, artifacts, ceramics production of animals (whose proximity to Man might generate discomfort, awe, or fear such as Wasps; lizards and snakes; crabs and lobsters; frogs; bull-heads; donkey-heads and horse-heads; wolves; or even cats with an aggressive posture) and crochet to represent the rich field of interpretation in a contemporary art context concerning design and craft traditions.



Figure 3-36. *Rosalinda*. Joana Vasconcelos. Rafael Bordalo Pinheiro faience painted with ceramic glaze, Azores crocheted lace. (Galería Horrach Moyà), Cordoaria Nacional, Lisbon. 2019. 25 x 55 x 125 cm. ©Joana Vasconcelos.

The artist Joana Vasconcelos was asked about the reasons of using glass for some of her public art projects, and she stated that glass is an interesting material for public art projects because it has many aspects such as color, lightness, transparency, fluidity, being organic, and also it is an outside material. It can be seen everywhere from facades of buildings, windows, mirrors to inside the houses, very close to all the people (Vasconcelos, personal communication, 7 November, 2018). Regarding the used approaches to prevent vandalism in her public art projects, she described:

---

<sup>94</sup> Rafael Bordalo Pinheiro (21 March 1846 – 23 January 1905) was a Portuguese artist known for his illustration, caricatures, sculpture, and ceramics designs and is considered the first Portuguese comics creator.

I think, you have to think about how people are going to connect with your work and what intentions you put in your work. Because it is a question of intention. If you provoke people, they will break it. If you don't provoke people, they might respect the work. I have been very respected because I didn't provoke vandalism. Vandalism is also a result of an attitude, so, what I do is not to provoke people, and in the other way, integrate pieces as much as I can do (Vasconcelos, personal communication, 7 November, 2018).

She added that few of her public art pieces have been vandalized but nothing that cannot be taken away. They have been attacked by graffiti.

She was also asked "what is the role of the artist in the society in her opinion?", she described that artists have an important role in representing their time and the community which she/he integrated into. She said, "to be an artist is one of the oldest assignments of humanity, because we are the only species that represent itself", she added, "artists are an essential part of society that represents the tribe for the future" (Vasconcelos, personal communication, 7 November, 2018). In her opinion, public art is important because it is representing our tribe, bringing people, society, and architecture closer together, prevents people from being away from their surroundings, and puts everything in the different levels of perspective and equation. She added to create and install a public art project, an artist needs the help of architects and engineers. Because the artists are not taught a lot of technical concepts, while an engineer and architect with their technical knowledge can make the artist's creative ideas happened and executed properly faster.

### **3.3.2 José Pedro Croft**

José Pedro Croft was born in Porto in 1958. He moved to Lisbon to study painting at the Escola Superior de Belas Artes de Lisboa (Lisbon School of Fine Arts) between 1976 and 1981 and sculpture under João Cutileiro in 1978/79. In 1981 he created his first outdoor sculpture for Évora Sculpture Symposium (Silvério, 2013). Today, he is one of the remarkable Portuguese contemporary artists who is known for his geometric sculptures (Figure 3-37) and



paintings. His artworks are kept and exhibited in several museums and collections including France's Centre Pompidou, Spain's Museo Reina Sofía, Brazil's Pinacoteca do Estado de São Paulo, and Museu de Arte Moderna of Rio de Janeiro (Croft, 2017).



Figure 3-37. *Untitled*. José Pedro Croft. Collection Banco Sabadell. Barcelona, Spain 2015. 700 × 500 × 20 cm (× 3). ©Sabadell.

Croft's glass sculpture *Uncertain Measure (Medida Incerta)* (Figure 3-38) represented Portugal at the 2017 edition of the Venice biennial and now it is installed in Casa da Arquitectura (Architecture House) in Matosinhos, Porto, Portugal (Figure 3-39).

*Uncertain Measure* consists of six sculptures in steel, glass, and mirror, measuring three by six meters connected to piles, and weighing 140 tons. *Uncertain Measure* was planned to follow the 2016 exhibition devoted to housing complexes built by Álvaro Siza Vieira, which was installed in Villa Hériot on the island of Giudecca during the biennial. João Pinharanda the curator of the Portuguese representation in Venice, stated that "rhythmic dialogue with the metric" of Álvaro Siza's project, Croft's sculptures "are clearly autonomous from this reference", developing "energy metaphors (acceleration, instability and ephemerality, vertigo or multiplication)" (Matosinhos City Council, n.d.).

José Pedro Croft's work (*Uncertain Measure*) is not vandalized because of the location of its installation and its robust structure. Also, because people can see and feel that the piece

is integrated into the place. It creates an industrial, architectural, and abstract space that is standing with a spiritual feeling of light shadowy colors.



Figure 3-38. *Uncertain Measure*. José Pedro Croft. Casa da Arquitectura, Matosinhos, Portugal. 2017.  
©Francisco Teixeira.



Figure 3-39. *Uncertain Measure*. José Pedro Croft. Casa da Arquitectura, Matosinhos, Portugal. 2017.  
©Rui Duarte Silva.

Light is a key factor in Croft's sculptures which can be transmitted through the glass. With this combination, Croft creates transparency, translucency, lightness, illumination, or a subtle reflection in his projects' spaces.

In the catalog of the *Uma Coisa (One Thing)* exhibition, which was held at the Galeria Municipal de Matosinhos, Portugal in March 30-May 11, 2019, Aurora Garcia stated that Croft

usually uses transparent glass combined with the mirror. Aurora believed that Croft uses glass for the following reasons:

to create ambiguous spaces penetrable through sight, spaces from where a sensation of gravity and weight fades away and the idea of dematerialization prevails, gathering the concepts of interior and exterior. These spaces, in many instances, are initially boundaries of architectural nature, which can surpass the measure of the body, without ceasing to have it present and to which, however, they fully prevent access (Croft, 2019, p. 178).

Croft's sculptures with geometric forms in glass, steel, and robust structures, create a space that lights, colors, and shadows touch our soul.

### **3.3.3 Conceição Cabral**

In 1968, Conceição Cabral was born in Angola but lived almost all her life in Portugal. She studied ceramics in the António Arroio<sup>95</sup> School of Visual Arts, in Lisbon (Lopes, 2004). After high school, she went to Alcobaca to attend an internship where she found some glass pieces, did some experiments, and fell in love with glass art as she explained "it was like love at the first sight" (Cabral, personal interview, 26 February, 2020). To know more about glass art, Conceição went to Germany, Spain, the Netherlands, and the USA. Conceição Cabral won the 5th Fine Arts Biennial in 2002 in Portugal (Lopes, 2004). Currently, she has a glass workshop in Valade dos Frades (Figure 3-40), near Leiria and Marinha Grande, and lives in Alcobaca, Portugal.

In March 2018 I visited Conceição Cabral's studio where it was like a permanent exhibition of her glass artworks next to her glass workshop. In her studio, I saw her glass sculptures, glass installations, and some furniture made of glass art (chair and table). Besides the creativity, she demonstrates high quality executed glass artworks. One of the most appealing things in her glass artworks was their colors.

---

<sup>95</sup> António Arroio is an art high school in Lisbon.

In an interview that was conducted in February 2020, Conceição stated that her Portuguese-Angolan background gives her a special perspective on the use of color. Conceição uses a colorful pallet that she believes to be the reason for her success. She mostly employs fusing and kiln-casting techniques. Conceição has installed several (mostly indoor) fusing glass panels in restaurants, hotels (Figure 3-41), and Caldas da Rainha buildings (Cabral, personal interview, 26 February, 2020). She has also made some glass flower sculptures for the Berardo garden in Bacalhôa Buddha Eden in Bombarral. In Figure 3-42 you can see two glass pieces that were made for this project in Conceição's hands. In this project for creating the flowers, she mainly used mate color glass instead of transparent glass.



Figure 3-40. Conceição Cabral in her studio in Valade dos Frades, Portugal. This photo was taken on 25.2.2020. ©Teresa Almeida.

In this interview, Conceição was also questioned if any of her artworks have ever been vandalized? She answered that none of her artworks have ever been vandalized. However,



she said one of her artworks in a building in Benedita has been damaged, because the building was close to an ATM and when a robber bombed the ATM to rob the money, her artwork was damaged due to the explosion (Cabral, personal interview, 26 February, 2020).

Conceição is an independent artist how loves glass art and makes what she loves the most.



Figure 3-41. Glass panel in Hotel Santa Maria in Fatima, Portugal. Executed by Conceição Cabral.



Figure 3-42. Conceição Cabral in her studio with pieces of Berardo garden project. This photo was taken on 25.2.2020. ©Teresa Almeida.

### 3.4 A Brief History of Glass Art and Public Glass Art in Iran

Handmade glassware has a long history in Iran, and it goes back to the first millennium BC. Although the art of glassmaking did not start in Iran, there are about more than four thousand years of continuous effort in the realm of innovation and expertise for decorative and consumer products, which is significant and remarkable (Yavari, 2012).

Shinji Fokai in *Iranian Glass* stated that humankind has long used the natural glass as a valuable stone in jewelry; while glass beads have been used for jewelry in Iran's plateau, since the beginning of agricultural civilization (Fokai, 1993). According to archaeological research, the first glass workshops that have been discovered until now were located in Mesopotamia, Syria, and Lebanon going back to five thousand years ago. With the advent of two civilizations, ancient Iran and Greece, glassmaking was transferred from Egypt to Greece and from Nineveh to Iran at the end of the first half-millennium BC (Yavari, 2012). The age of Aegean glass and the age of Persian glass afterward appeared in the west and east respectively with distinct characteristics.

The Oldest glass pieces which were found in Iran were several cylindrical beads (Figure 3-43) from the Middle Elamite period in a sanctuary in the vicinity of the Tchogha Zanbil<sup>96</sup> Ziggurat (Figure 3-44) with Kasi and Elamite designs (del Vallès, 2018). Then we have the most significant glasswares in the Sasanian empire that dominated Mesopotamia and Iran for more than four centuries (third to seventh centuries \_224-651 AD) in the neighboring Roman-Byzantine empire (Kroger, 2012). The glass pots with honeycomb design with the overall pattern of ground decorated, cut, and polished hollow facets were the signature of Sasanian glass Pottery (Whitehouse, & Brill, 2005) (Figure 3-45, Figure 3-46).

The technique of glass production in the Islamic period improved as many changes seem to have begun in the 9<sup>th</sup> century. The most significant change was the quality of glass; glassware improved to be more colorless which previously was greenish or yellowish (Figure 3-47, Figure 3-48) (Kroger, 2012).

---

<sup>96</sup> chogha Zanbil (Dur-Untash, or City of Untash, in Elamite) was founded by the Elamite king Untash-Napirisha (1275-1240 BCE) as the religious center of Elam.





Figure 3-43. Glass objects used at the walls and doors of the Tchogha Zanbil Ziggurat. 2.500 BC. Khuzestan province in southwest Iran ©Mohammadamin Emami.



Figure 3-44. Tchogha Zanbil Ziggurat. Khuzestan province in southwest Iran ©OUR PLACE The World Heritage Collection.



Figure 3-45. Sassanian glass bowls, Azarbaijan Museum, Tabriz, Iran. ©Alborz Fallah.



Figure 3-46. Sasanian Glass. Bowl, thick, colorless glass, facet-cut, Iran or Iraq; 6th-7th century, H: 8.3; Diam: 11.5 cm. The David collection ©www.davidmus.dk.



Figure 3-47. Colorless glass blowing. 10th century. ©(Carboni, & Sabah, 2001, p 88).



Figure 3-48. Colorless glass blowing. mid-10th century. ©(Carboni, & Sabah, 2001,p 86).

Iran retained its position in the development of glassware making until the Mongol invasion in the 13th century when glass-making had a cessation for one and half centuries because the majority of glassblowers immigrated to the west. During the sixteenth and nineteenth centuries, kings of the Safavid dynasty and Pahlavi dynasty paid special attention to renovate traditional arts such as glass art. They recalled masters of glassblowing from Italy and Germany to train Iranian glass artists. Thus, the quantity and quality of glass production improved (Yavari, 2012). However, in the middle of the Pahlavi dynasty (the 1940s and 1950s) due to the lack of interest, we witnessed a decline in glassware making (Yavari, 2012). Orsi, Arasi or Orsi are sash windows, resulting in craftsman skills in the Safavid era in Iran. There is no evidence of producing Orsi windows or sash windows before the Safavid era in Iran, and the oldest examples of sash windows in Iran were found from the Safavid era and after that time. In Safavid and Qajar era, Orsi windows were a kind of luxurious decoration which was used in different places like houses, Mosques, schools, Hussainiyas<sup>97</sup> (Javani, Javani, & Moshkforoush, 2010) (Zareie, 2014).

Orsi windows are a mix of wooden Girih tiles<sup>98</sup> with colorful pieces of glass (Azarian Sadabad, Amirdastmalchi, & Haj Ostad Nourani, 2014). The passing of light through the colored glass brings spirituality to the interior space and enlarge its actual size (Figure 3-49). In addition, Orsi in Iranian architecture has a special value because its function refers to the light allegory in the Iranian ancient religions and beliefs. Before the advent of Islam in Iran (637–651), many religions like Zoroastrianism, Manichaeism, and Mithraism used the metaphor of light to illuminate their doctrines (Javani et al. 2010). In Islam, light is a symbol of God and there is a chapter with the name of light in the Quran<sup>99</sup>. In this chapter God introduces himself as a light of earth and heaven: “Allah is the Light of the heavens and the earth” [Quran, 24:35].

Light is in contrast with the darkness and one of the most significant elements in ancient Iranian religions is the victory of the light over devil darkness (Hanachi, 2015). Traditionally Iranian have a hatred of darkness and they tried to bring light inside their houses, worship

---

<sup>97</sup> Hussainiya is a congregation hall for Shia commemoration ceremonies, especially those associated with the Remembrance of Muharram.

<sup>98</sup> Girih tiles are a set of five tiles that were used in the creation of Islamic geometric patterns using strapwork (girih) for decoration of buildings in Islamic architecture.

<sup>99</sup> Sūrat an-Nūr (Arabic: سورة النور, "The Light") is the 24th chapter of the Qur'an with 64 verses.

places, and almost all interior places. They bring light into interior places considering the climate of the place – Iran is a big country and has 4 different climates (cold; hot and arid; semi-arid and humid; and mild climates). Architectures in the 18<sup>th</sup> to 20<sup>th</sup> centuries in Iran consider two types of elements in designing Orsi windows based on the specificity of climates: first, light controllers, and second, light amplification. About two-thirds of Iran's are in the hot, arid, and semi-arid climate, light controllers were considered fundamental in the structure and organization of Iranian architecture (Hanachi, 2015). Iran's climate conditions and specific religious beliefs in Iranian ancient architecture resulted in an inward seeking architecture, where one can see no opening in external walls while the inside facade is full of windows facing the courtyard (Ahani, 2011).



Figure 3-49. Haj Agha Ali's house in Rafsanjan, Kerman, Iran. Gajar Era. © Sara Lava.



Figure 3-50. Dolatabad Garden, Yazd, Iran. Built in 1747. © Mahdi Taheri.

Orsi windows are movable panels that are opened by sliding vertically or horizontally, instead of flipping on the heels round (Figure 3-50); this feature resulted in a minimum amount of occupied place during opening and closing (Azarian sadabad, et al. 2014). They are designed to be a part of the architectural decoration which manage the light by a handful of wooden details containing tiny pieces of colored glass. Different colors used in each piece of glass have a psychological impact on human behavior (Arjmandi, Tahir, Shabankareh, Shabani, & Mazaheri, 2017). In addition, *mild* colors control and balance the intensity of light. According to Islamic beliefs, colorful light is a symbol of God's holy presence in the interior



architectural design. *Nasir ol Molk* Mosque (Figure 3-51) in the city of Shiraz is a good example which was built from 1876 to 1888, by the order of Mirzā Hasan Ali (Nasir ol Molk), a Qajar ruler. The Western bedchamber of the mosque has seven doors in wooden colorful glass connecting to the courtyard of the mosque. This mosque is acknowledged as the pink mosque because of using considerable pink color tiles in its interior design. In this mosque people can feel and experience the effects of light, observing dynamic images appear and change continuously, depending on the weather and the position of the light. In addition, dynamic images of colored light are a symbol of God's presence.

Designers of Orsi windows used abstract geometrical shapes due to the prohibiting use of human images in Islamic arts. This geometrical shapes with different angles from each other, create sound effects, and therefore Orsi windows have acoustic resonance effect which is the subject of acoustic science (Azarian Sadabad, et al. 2014) (Sharafipour, 2006). Orsi windows also limit the visibility from the outside to the inside of the houses and provide privacy in the interior. This characteristic of Orsi windows leads architectures to use them inside the houses as a dividing wall too; for an instance, in Aminiha Hosseiniyeh (Figure 3-52) Orsi windows are employed as a dividing wall inside the house and are also used for dividing the rooms from the courtyard. At last, it shouldn't be unmentioned that based on the experience of the ancestors and those who have used the Orsi windows, these kinds of windows prevent the appearance of annoying insects and reptiles inside the houses by creating colorful lights (Sharafipour, 2006).



Figure 3-51. Nasir Al Mulk Mosque, Shiraz, Iran.  
Built-in Qajar era. © Mohammad Nouri.

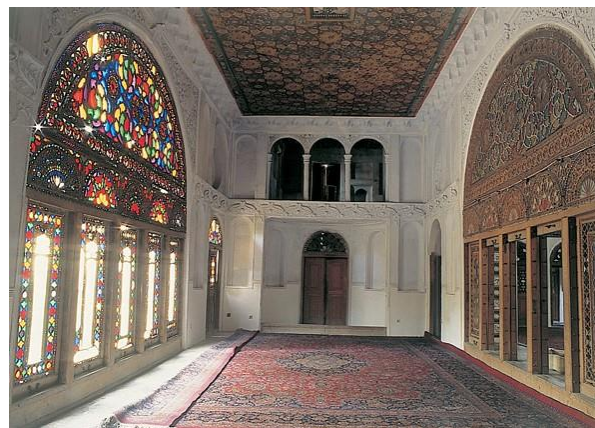


Figure 3-52. Aminiha Hosseiniyeh, Qazvin, Iran.  
Built in 1858. © Marziye Falahnejad.

Orsi windows are fundamental elements in traditional Iranian architecture in the 18<sup>th</sup> to 20<sup>th</sup> centuries. The special characteristic of Orsi windows is the attractive light reflection in interior spaces, referring to Islamic and Iranian ancient religions and beliefs. Besides its beautiful effect on the exterior and interior design of a building, it also creates a dynamic environment with colorful lights and has acoustic resonance effects. Moreover, Orsi windows provide a safe atmosphere for interior inhabitation - mostly by women - by making visibility limitations and also by keeping reptiles and insects away to enter the house because of colorful lights (Faghihi, Quintas, & Almeida, 2017 b).

### **3.5 The Current State of Glass Art and Public Glass Art in Iran**

Iran had many ups and downs in the development of glass art. In the last three decades, there was an ascending improvement in glassware making in Tehran and the four main cities of Iran. However, in recent years, glassware making, and glass art collapsed in Iran again. According to Arezoo Khanpour, the few remaining traditional glass factories (Figure 3-53) are located in the suburbs of big cities such as Tehran. They create decorative glass objects and some practical glassware for daily demands (Khanpour, Sohrabi Nasirabadi, & Mohammadzadeh, 2020).

In an interview with Saeed Golkar, a master glass artist and a member of Cultural Heritage, and Handcrafts and Tourism Organization of Iran in January 2016, he stated that in 2006, 120 glass workshops in Tehran made glassware and some of them trained glassblowers and artists. Now only eight of those glass workshops exist. This decline is due to different issues, mostly political and economic issues. He explained that in 2016 more than 90% of glass workshops were closed due to the lack of attention and budget allocation to the growth and development of glass workshops by the government, which was a result of sanctions against Iran started from 2006. The glass workshops needed to receive a subsidy for gas from the government, but the lack of government support forced them to close glass workshops. Therefore, it was not affordable for glass artists and glassblowers to do what they have done before (Golkar, personal communication, 10 January, 2016).



Figure 3-53. Alvan Bolour factory. Traditional glassblowing factory in the suburb of Tehran, Iran.  
Captured in 24.11.2020. ©Arezoo Khanpour.

One of the obstacles to the improvement of glass art in Iran is the lack of investment in educating glass artists and lack of knowledge about techniques of glass art. Therefore, the glass artists are not aware of glass versatility to create wonderful artworks.

In the current century, we are witness to architectural glass examples in Iran. Several companies in Iran create glass domes, ceilings, doors, and windows for mosques, hotels, and luxury apartments. These companies usually use stained glass techniques and sometimes



fusing techniques. *Kajeh decoration company* in Iran is one of several companies that execute the architectural decorative stained glass domes, windows, doors, and other decorative designs. The Dome of Jaberi Mosque in Bandar Abbas, south of Iran is created in the Tiffany technique in 2017 by Kajeh decoration company (Figure 3-54).

Afshin Hajhasan is one of the glass craftsmen who creates and installs the glass domes and architectural glass pieces for mostly private clients (Figure 3-55).

In addition to architectural glass art pieces, there are few glass sculptures installed outdoor in Iran such as *Wave*<sup>100</sup> (Figure 3-56). This sculpture is executed by Rohollah Yousefipour (he is a local artist) with the fusing technique in Babolsar, Mazandaran, Iran.



Figure 3-54. Inside and outside of Dome of Jaberi Mosque. Kajeh decoration company. Bandar Abbas, Iran. 2017. Dimensions: Diameter: 1.2 m, Height: 1.2 m ©Kajeh.com.

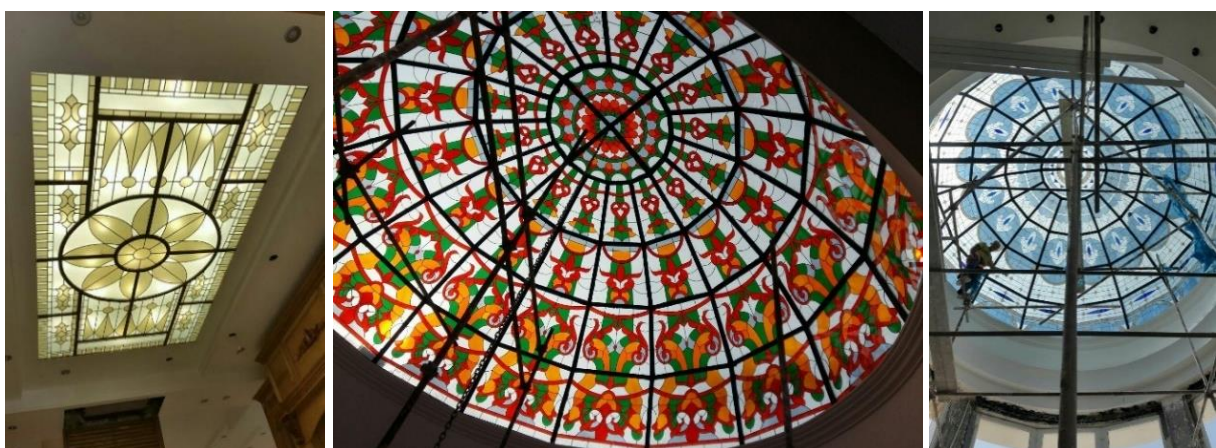


Figure 3-55. Images of glass domes and ceilings executed by Afshin Hajhasan. Iran. ©Afshin Hajhasan.

---

<sup>100</sup> In Farsi: موج.



Figure 3-56. *Wave*. Rohollah Yousefipour. Shilat Square, Babolsar, Iran. 2018. ©Shishebaran.

Monir Shahroudy Farmanfarmaian (1922-2019) was one of the great Iranian artists that was influenced by traditional folk art and cut-glass mosaic techniques<sup>101</sup> with geometric patterns (Shabani, 2017). Monir was educated at Fine Arts College of Tehran, Iran. After the Iranian Revolution, she moved to New York and worked there for over 26 years. Then she returned to Iran in 2004 and established her studio (Figure 3-57). She was internationally recognized and her artworks have been exhibited in museums such as the Museum of Modern Art MoMA, Guggenheim Museum, Grand Rapids Art Museum, Leighton House Museum, Haus der Kunst, Irish Museum of Modern Art (IMMA), Zentrum Paul Klee, Savannah College of Art and Design Museum, Serralves Museum of Contemporary Art in Portugal and more.

---

<sup>101</sup> Āina-kāri.



Figure 3-57. Monir Shahroudy Farmanfarmaian in her studio in Tehran, Iran. 2015. ©James Whineray.

Some Iranian artists like Monir Shahroudy Farmanfarmaian, Shirazeh Houshiary, and Saman Kalantari were educated in glass art abroad, and their glass artworks are internationally recognized. In the creation of artworks, they are mostly inspired by Iran's glass art tradition and identity.



### 3.6 A Brief History of Glass Art and Public Glass Art in Great Britain

Romans were the first people to bring glassmaking into Britain about 2000 years ago by setting up small workshops and producing glassware for general consumption (A brief history of glassmaking, n.d.). Examples of Roman glass could be found in museums such as the Bristol Museum, and British Museum (Figure 3-58).



Figure 3-58. British Museum. Collection of Roman glasses from the 1st and 2nd AD century.  
©Parinaz Faghihi, July 2017.

Roman glassware had a high-quality technique of making and interesting aesthetics. After the invention of glass blowing in the first century BC and the increase of production, Roman glassware becoming cheaper, therefore, they were not used just for fine tableware, but also, used for packaging and transport of some foodstuffs. There are some complete glass vessels surviving from the Roman period which were buried in the graves with the dead placed, with other possessions (Price, 1998).

Morris (1988) stated that Romans in the 5<sup>th</sup> century AD found that a bit of copper dispersed in the glass melted could produce a ruby-colored glass; then, glassmakers in medieval times

discovered the addition of manganese would produce a rose-pink color. Probably before the 5<sup>th</sup> century, color glass was made by accident or impurities caused in the production process.

Saint Benedict Biscop was the first person who brought glass-making to Sunderland, and Britain in the 7th Century AD. Biscop and his team of glaziers produced stained glass windows for Bishopwearmouth Monastery (National Glass Centre, n.d.).

In the UK, there are many examples of stained glass, especially in churches. One of the old stained glass windows in England is *Tree of Jesse* from York Minster Cathedral (c. 1170) (Figure 3-59) (Horsfield, 2015). Other outstanding examples are the stained glasses of Canterbury Cathedral<sup>102</sup> (Figure 3-60), York Minster<sup>103</sup>, Coventry Cathedral<sup>104</sup>, Gloucester Cathedral<sup>105</sup>, Buckfast Abbey<sup>106</sup>. All these representations of stained glass during the centuries in the UK, prove the popularity of glass art among British people. However, the British interest in glass material prompted them to invent machinery devices. The process of producing float-glass was invented in England in the 1950s, which obsoleted all the other methods of producing clear flat glass (Morris, 1988). For many centuries, flat glass was produced by blowing or casting, until the English engineer, Henry Bessemer (1813-1898) produced the first flat glass process on 22 March 1848 (Nascimento, 2014). The development of flat glass was very important, as the flat glass can be polished, bent, molded, laminated, and tempered in industrial lines. Nascimento stated:

The resulting products provide year-round comfort, protect fabrics from fading, reduce energy costs, block sound transmission, improve security in vehicles, and replace walls of brick and mortar with panoramas of light and natural beauty (Nascimento, 2014, p. 55).

---

<sup>102</sup> Canterbury Cathedral, in Canterbury, Kent, England 12th to 15th century plus 19th- and 20th-century glass.

<sup>103</sup> York Minster, in York, England, 11th- to 15th-century glass.

<sup>104</sup> Coventry Cathedral, in Coventry, West Midlands, England. The Cathedral is founded in 597 and rebuilt several times during the centuries.

<sup>105</sup> The windows of Gloucester Cathedral contain stained glass from the 14th century to the present day.

<sup>106</sup> The stained glass in Buckfast Abbey is executed by Dom Charles Norris in 1968 in Devon, England (<https://www.buckfast.org.uk/modernhistory>).

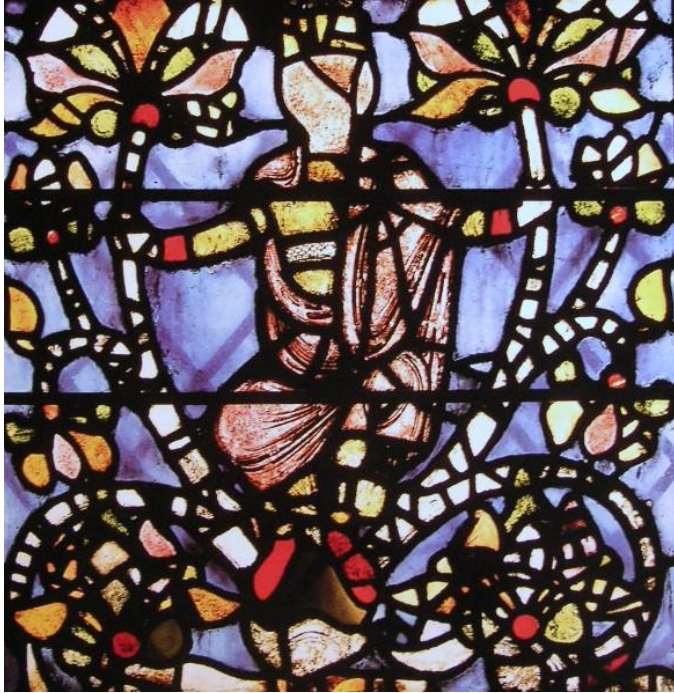


Figure 3-59. Detail of Tree of Jesses. York Minster, England. 1170. (Horsfield, 2015, p 34).

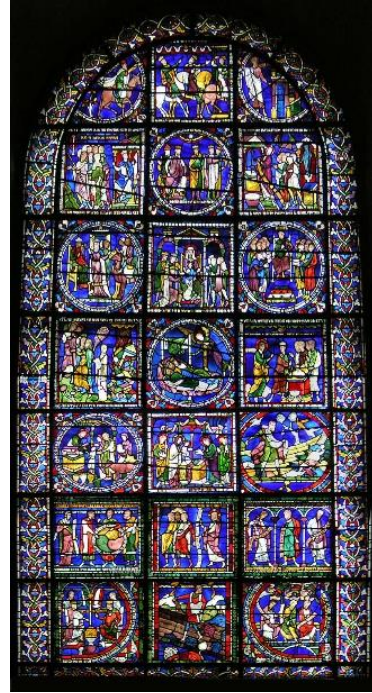


Figure 3-60. Stained glass windows of Canterbury Cathedral. Kent, UK. 13th Century. (Horsfield, 2015, p 2).

In the early years of the 21<sup>st</sup> century, a creative global network of *glass world* developed both techniques and ideas behind the artists' works and also expanded the artistic parameters of the glass medium. This global network of glass world includes artists, galleries, connoisseurs, and supports networks such as the *Glass Art Society* in the USA and *Contemporary Glass Society* in the UK (Petrie, 2011). In UK, in addition to universities, museums that archive and display extensive collections of stained glass have assisted glass art developments. For example, the London Victoria and Albert Museum holds and exhibits a great collection of contemporary glass art and stained glass pieces from the 12th century; or, the Stained Glass Museum <sup>107</sup>in Ely Cathedral founded in 1971 as a repository to rescue stained glass windows which has a wide range of collection of over 1000 British stained glass panels of all periods; or, the Museum of Sir John Soane in London contains a significant collection of Continental stained glass panels from the late 15th to 18th centuries (BSMGP, n.d.).

---

<sup>107</sup> <https://thestainedglassmuseum.com/>



### 3.7 The Current State of Glass Art and Public Glass Art in Great Britain

About 50 years ago, one of the first contemporary arts that went on public display in London was Glass Fountain (Figure 3-61, Figure 3-62) by Allen David<sup>108</sup>. This work was commissioned by Mrs. Gilbert Edgar, a wife of Gilbert H. Edgar CBE, who was a city sheriff of London in 1963-4. Glass fountain went on display in 1969 and was restored and reinstated in July 2012 (“A fountain of glass”, 2016). Other glass art sculptures by Allen David are also installed in other countries (Figure 3-63).



Figure 3-61. *Glass Fountain*. Allen David. Guildhall Piazza, London. 1969.



Figure 3-62. Details of *Glass Fountain*. Allen David. Guildhall Piazza, London. 1969.

---

<sup>108</sup> Allen David (1962-2014) was born in India, moved to Melbourne to get his Bachelor's degree in architecture. Then he moved to London and spent his time painting and creating sculptures, received commissions for a large glass screen from Latrobe University in Melbourne and for the City of London Glass Fountain at Guildhall. Mr. David spent five years in Tel Aviv, where he received commissions from the Tel Aviv municipality for a glass fountain at Dizengoff Circle (later replaced by Yaacov Agam Fire and Water Fountain) and for The Magician a glass sculpture at Einstein Street (Figure 3-63) (The Magician. [www.israelpublicart.com](http://www.israelpublicart.com)).



Figure 3-63. *The Magician*. Allen David. Einstein Street median at Levi Eshkol, Tel Aviv, Israel. 1989.

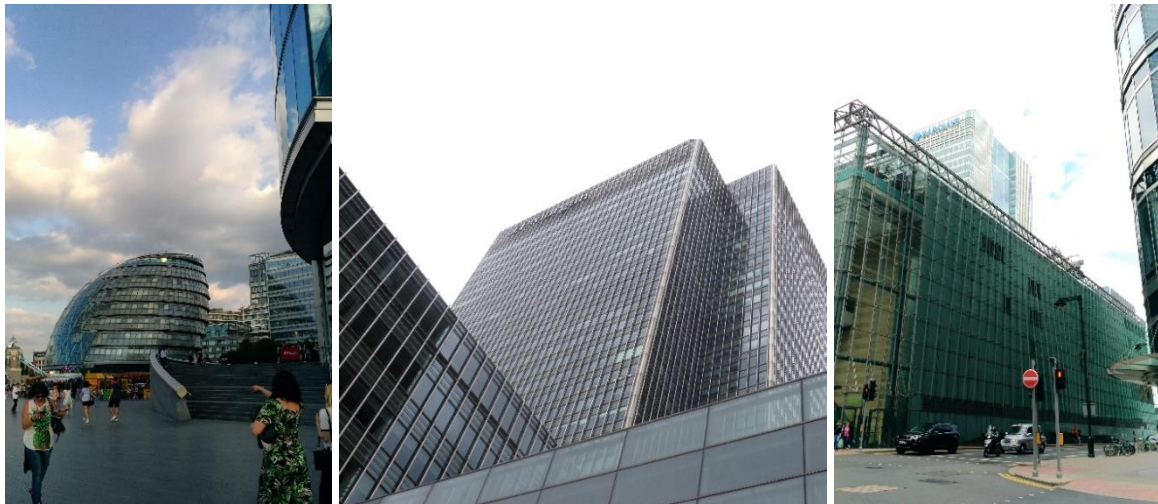


Figure 3-64. These are photos of buildings in London that are covered and designed by the glass.  
The UK. ©Parinaz Faghihi, July 2017.

In the last 25 years, there has been a growing trend in England to use glass in architectural design and public art projects. There are many buildings in England and especially in London that are covered by glass<sup>109</sup> (Figure 3-64). Therefore, glass can be seen everywhere and anywhere, from the façade of buildings and shopping centers to public art pieces and urban designs. For example, In 2006 Katayoun Pasban Dowlatshahi<sup>110</sup> designed the 6 large glass panels of the façade of a glass pavilion in the *Princesshay* shopping district in *Exeter* City,

<sup>109</sup> The buildings which are covered with glass were also becoming a trend in Portugal and Iran in the last 25 years.

<sup>110</sup> Dr. Katayoun Pasban Dowlatshahi is an Iranian-born British artist who is specialist in print-making and photography in the field of public art, architectural glass and time based media (Dowlatshahi, n.d.).

England (Figure 3-65) (Dowlatshahi, n.d.). In this architectural glass art, the artist is inspired by the cathedral nearby and designed the glass panels with detailed images of the cathedral windows.

In front of the Exeter Traceries, Jeff Bell's collection of glass *Pebble seats* is installed (Figure 3-66). At night, the glass made seats are gradually illuminated with a rainbow sequence of colors while the Pebble seats' design was inspired by the texture of Exeter's weather-beaten surroundings to reveal a sightline from St. Chapel (Salameh, 2014). The Pebble seats is an example of public glass art since it has the features of being a public art piece such as accessibility to everyone, site-specificity, provoking and engaging people.



Figure 3-65. *Exeter Traceries*. Katayoun Pasban Dowlatshahi. 2006. Princesshay, Exeter, UK. © Katayoun Pasban Dowlatshahi.



Figure 3-66. *Pebble seats*. Jeff Bell. Princesshay, Exeter, UK. 2009? © Ian James Cox.

As mentioned in the previous section (3.6), museums and universities in Great Britain have significantly contributed to the improvement of glass art/public glass art. Among them, the *National Glass Centre* in Sunderland has shown a constant impact on the improvement of contemporary glass art, in particular in the north of England (Watkinson, personal communication, 9 July, 2020). The National Glass Centre has been established close to Sunderland University in October 1998 and has been funded by the Arts Council, the University of Sunderland, Tyne and Wear Development Corporation, European Regional Development Fund, and Sunderland City Council (National Glass Centre, n.d.). The National Glass Centre involves a museum of glass-making history and several galleries with changing exhibitions. It has also organized many hot glass demonstrations and educational programs for different ages (National Glass Centre, n.d.). The proximity of the National Glass Centre and the glass department of Sunderland University has established a close relationship between them. This provides a good opportunity for students to make use of the National Glass Centre's facilities to work with glass.

Besides the aforementioned places, hot-glass studios around Great Britain create artistic and decorative objects, provide some experimental sessions (to give an understanding of basic techniques under the tuition of our highly qualified glass artists), and glassblowing demonstrations for glass lovers. One of these places is *Peter Layton London Glassblowing studio glass gallery*. An interview was conducted with Louis Thompson, when visited the studio glass gallery on 28 July 2017. Thompson is one of the glass artists who work there (Figure 3-67), he stated that he gained his Bachelor of Arts degree in 1988 and has been working in several studio glasses for around 30 years and gained experience (18 years in *Peter Layton London Glassblowing studio glass gallery*, since 2001). In 2011, he completed his Masters's degree at Royal College of Art (Thompson, personal communication, 28 July, 2017). One of his work that was installed in public space was two large scale installations for the 2016 exhibition *Reflections* in Salisbury Cathedral (Figure 3-68). "It consisted of 81 solid sculpted glass bottles arranged on steel stands inspired by votive candle stands in the cathedral" (Thompson, n.d.).

There are other examples of glass art in public spaces which are mentioned in chapter 2. In the following sections, to investigate examples of glass art in public spaces in England, the



public glass arts of Andrew Moor association, Graham Jones, Danny Lane, Kirsty Brooks, Brian Clarke, David Pearl and Amber Hiscott is addressed.



Figure 3-67. Louis Thompson in Peter Layton London Glassblowing studio glass gallery. Captured on 28 July 2017. ©Parinaz Faghihi.



Figure 3-68. *Devotion* 2016. Louis Thompson. Salisbury Cathedral, Salisbury, England. 2016. Height: 245cm. ©Ash Mills. Retrieved from <https://www.louisthompson.com/salisbury-cathedral>. Access date 2.11.2020.

### 3.7.1 Andrew Moor Association

Andrew Moor is a British freelance artist, a glass art consultant, lecturer, writer, and project manager assisting other artists to translate their visions into the glass. He has been involved in running hundreds of glass art projects, throughout the UK and in many other parts of the world. He founded Andrew Moor Association in 1984 to assist architects in managing glass art projects. During his professional work, he works individually or in collaboration on creating public spaces with the feature of capturing the viewer and enhancing the site (Moor, n.d.). Andrew wrote three books about architectural glass art including *Contemporary Stained Glass*, *Architectural Glass Art*, and *Colours of Architecture*<sup>111</sup>.

Andrew Moor was invited for an interview on 12 August 2016 and was questioned about his successes in public glass art (Moor, personal communication, 12 August, 2016). He was asked about the motivation to choose glass as a material for his artwork in public spaces. He stated:

The glass is a great medium for public art because it is kinetic; it will change with the weather, the seasons and the light. Also, it can be monolithic, standing alone; or it can be integrated into the architecture, either as cladding, glazing, balconies, canopies, etc.

Andrew executed a very impressive public glass art by the name of *Bridlington Spa* at Bridlington, UK (2010) (Figure 3-69, Figure 3-70). This impressive public art reflects the history and topography of this coastal town. There are eight external glass screens that each of them shows a detail from the local environment, including the topography, local industry, and local landmarks. The sponsor of the development of the *Spa Gardens* project was Central and local government. By this project, the local government aimed to regenerate the seaside places by a cultural-led approach for a range of events and performances in an outdoor setting. The panels were made up of two layers of glass laminated together with an image both inside and outside the laminate, creating an interesting kinetic experience for the viewer. The panels

---

<sup>111</sup> *Contemporary Stained Glass* was published in the UK, the USA version is published as *Architectural Glass* and the France version as *Les Vitrail dans l'architecture moderne*; *Architectural Glass Art* was published in the UK and the USA in 1997; and *Colours of Architecture* was published in 2006 (Moor, n.d.).



were well accepted by the local community and tourists, especially, the way they were planned to light up at night (Moor, n.d.) (Figure 3-69). In addition, they were well designed and the lamination technique that the artist had chosen to execute his idea made a safeguard against vandals.



Figure 3-69. *Bridlington Spa*. Andrew Moor-Bridlington, UK. 2010. night light ©Andrew Moor



Figure 3-70. *Bridlington Spa*. Andrew Moor. Bridlington, UK. 2010. Daylight ©Andrew Moor

On the 25th of July 2017, I visited Andrew Moor in his studio in London. In his studio, he showed me some proposals of public glass art projects that were not executed but were proposed to the clients. He said that he as an art consulter works with glass artists or glass factories to manage the projects. He added that modern architectures ask for big glass art pieces (Moor, personal communication, 25 July, 2017). Therefore, the Andrew Moor association worked with different artists such as Kirsty Brooks, Danny Lane, Graham Jones, and other artists who could create and execute large-scale glass art pieces. For example, *Bridlington Spa* was designed by Kirsty Brooks and Andrew moor association.

Andrew Moor association executed many projects all around the world. One of the public glass art projects which were executed by the Andrew Moor association and designed by Martin Donlin is *Villa Astana* in Kazakhstan. This project is created by toughened and laminated cast glass with screen printing on the reverse surface with a special texture that responds well to sunlight and artificial light (Moor, n.d.).



Figure 3-71. Villa Astana. Andrew Moor association. Designed by Martin Donlin. Astana, Kazakhstan. 2017. Dimensions: 7.5m wide X 2.4m high. © Andrew Moor.

### 3.7.2 Kirsty Brooks

Kirsty Brooks is an architectural glass artist. She works with photography as a means of accurately capturing an object, atmosphere, or quality of light. She got a BA in Architectural Glass and Painting from Edinburgh College of Art in 1995. She combines the imagery and ideas drawn from the surrounding environment. To explain her work, she says:

I photograph or scan objects or textures and digitally manipulate and overlay them, playing with the scale and its eventual impact. The resulting composites are digitally printed onto film or screen-printed using glass enamels onto large sheets of float glass. These are often layered or obscured with textured, sandblasted, and acid-etched panels. These sheets of glass are either suspended using tensile cables or framed within the fabric of the building. Each piece is created specifically for the surrounding architecture and location and incorporates ideas relating to the function of the building and its aesthetic qualities (Brooks, n.d.).

In addition to Bridlington Spa (Figure 3-69), which is an example of Kristy's work, *Kirkstall Bridge Clock* tower is another example of her work which is executed in 2015 (Figure 3-72,

Figure 3-73). This clock tower is created as a response and reaction to the industrial history of the city of Kirkstall (near Leeds) and in its design, the images of the local forge and textile mills are used (Cowan, 2016).



Figure 3-72. *Kirkstall Bridge Clock Tower*. Night light. Kirsty Brooks. Kirkstall, Leeds, UK. 2015. Dimensions: 120cm x 400cm x 50cm. ©2020 Axisweb.



Figure 3-73. *Kirkstall Bridge Clock Tower*. Daylight. Kirsty Brooks. Kirkstall, Leeds, UK. 2015. © 2020 Axisweb.

The artist used screen printing of the photographs of surrounding industrial elements to create the visual component of the clock mechanism as Cowan stated: “The clock tower itself is wrapped in an image of a woolen spool, reflecting the blanket making and textile fulling activities carried out nearby” (Cowan, 2016). Moreover, the clock face glows and changes subtly from cool to warm depending on the light passing through (Cowan, 2016).

Kirsty Brooks has several architectural glass art and public glass art projects in her resume. The design of the glass façade for the National Film School at the Institute of Art and Technology in Dun Laoghaire in Ireland, and also the photography of the series of glass screens in *Glasgow Fort retail park* are two examples of Kristy’s work (Figure 3-74).





Figure 3-74. Glasgow Fort retail park. Kirsty Brooks- Created in conjunction with Macgregor Smith Landscape Architects. Glasgow, Scotland. 2014-2016. Dimensions: 500cm x 120cm x 2.6cm typically. ©2020 Axisweb. Retrieved from <https://www.axisweb.org/p/kirstybrooks/#artwork>

### 3.7.3 Danny Lane

Danny Lane was born in Urbana, Illinois USA (1955) and worked actively in London since the 1980s. He moved to the UK in 1975 to study with stained glass artist Patrick Reyntiens and then studied painting at Central School of Art<sup>112</sup>, London with Cecil Collins and developed applied art objects inspired by Isamu Noguchi (Lane, n.d.). His glass sculptures and furniture in different scales from domestic to massive pieces are well-known worldwide (Lane, n.d.).

*Ellipsis Eclipses* (Figure 3-75) is a 12-meter high glass sculpture installed in Grainger Town, Newcastle upon Tyne, commissioned by Northern Arts for Land Securities Properties Limited (Lane, n.d.). Lane stated: “the structure was in keeping with the region’s glass-making and

<sup>112</sup> When he studied there, the name of school was Central school of art which then in 1989 merged with Saint Martin’s School of Art to form Central Saint Martins College of Arts and Design (Llewellyn, 2015).

maritime history” (BBC News, March 8, 2005). *Ellipsis Eclipses* is created by layered glass and steel with more than 1,100 components, including hundreds of 12mm thick glass plates held together by a steel rod in 2005 with 12 meters’ height which is reminding a mast of a tall ship (BBC News, March 8, 2005). This public glass art looks robust while at the same time it is impressive and expressive because of its glass part that plays with lights and shadows.

Another example of Lane’s public glass art is the *Opening line* (Figure 3-76) which is a sculpture of about 90 meters in length and up to five meters in height in a space between two main bus runways (Nexus, n.d.). This public glass art contains a wide range of images (Figure 3-77) including a bird, the prow of a ship, and a musical instrument which indicating the diverse culture and history of Gateshead (Gateshead council, n.d.). *Opening Line* is a set of steel and glass shapes that can be interpreted as a collection of pictograms, which is not a simple story as many interpretations can be brought to it (Nexus, n.d.). This project demonstrates how public glass art can be installed in a very busy and crowded location without scaring about the features of glass fragility.

*Lock Level Line* is a series of cast iron and glass sculptures that are installed in the Paddington Basin in London (Figure 3-78). This public glass art project is executed by Danny Lane in 2003 (Lane, n.d.). The design of this project is in harmony with the modern and minimal design of the surrounding buildings.

Parting of the Waves<sup>113</sup> in Canary Wharf Plc in east London (2003), and *Borealis* (2006) for the General Motors Renaissance Center in Detroit, USA, are examples of Lane’s architectural and sculptural glass art on a large scale.

---

<sup>113</sup> This work is not accessible to the public without permission.



Figure 3-75. *Ellipsis Eclipses*.  
 Danny Lane. Grainger Town,  
 Newcastle upon Tyne. UK. 2005.  
 ©Danny Lane.



Figure 3-76. *Opening line*. Danny Lane. Gateshead, UK. 2004.  
 Dimensions: H450 xL9000 x D80 cm. ©Danny Lane.

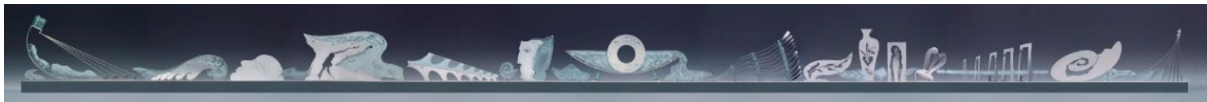


Figure 3-77. Detail design of the *Opening line* project. Danny Lane. Gateshead, UK. 2004.  
 Dimensions: H450 xL9000 x D80 cm. ©Danny Lane.



Figure 3-78. *Lock Level Line*. Danny Lane. Paddington Basin, London, UK. 2003. Dimensions: H280  
 xL1300 x D33.5 cm. ©Danny Lane.



### 3.7.4 Graham Jones

Graham Jones is one of the world's leading architectural glass artists. He was born in Warwickshire, UK in 1958. He won the major prizes for stained glass students and completed his first commissions<sup>114</sup> (Jones, n.d.). His works are notably original because of the vibrant colors and soft brush strokes and bold forms to geometric patterns and representational elements.

The window of the modern extension of Jesus College Cambridge (Figure 3-79) is designed by Graham Jones in 1999 with a large Mediterranean blue pool (Fuller, 2006). Kate Baden Fuller about this work explained: "a type of open-ended frame within the design stops the color floating off, and the warm blue light gives a fresh, soulful glow to the interior" (2006, p. 28).



Figure 3-79. The window of Quincentenary Library. Graham Jones. Jesus College. University of Cambridge. 1999. © Iain Gutteridge.

The British Gas Boardroom (2000); a series of screens throughout the building of Holmes Place in Kensington, UK (2001) and Lisbon, Portugal (2002); the window of Dortmund Chapel

---

<sup>114</sup> The church of St David in Hendy, near Pontardulais in the UK.

(2005); the landmark on the corner of office and apartment central development in the Birmingham new street (2005); and the windows of Dortmund Melanchthon Kirche (1999-2005) are just some examples of Graham Jones architectural glass art projects. The glass panels in the arrival and departure hall of the International Airport Hong Kong, China are also the recent projects that were executed by Graham Jones (Figure 2-42 and Figure 2-43).

### 3.7.5 Brian Clarke

Brian Clarke (born 2nd July 1953) is the world's most widely recognized British painter and architectural stained glass designer who used screen-printed images in his stained-glass work.

In England, Brian Clarke made the Victoria Quarter stained glass. This project (Figure 3-80) was finished in 1990 in collaboration with architects Derek Latham & Co in the refurbishment of Queen Victoria Street and Sir Frank Matcham's 19th century. According to the Guinness book of world records, this architectural public glass art was the largest secular work of stained glass in the world at the time of its completion in 1990 (Brian Clarke Studio, n.d.). The Victoria Quarter stained glass is architectural glass as well as a public glass art project as it has both features of categories.

The entrance façade of an important skyscraper in Saudi Arabia is one of the largest architectural glass art projects until now and one of the largest stained glass window in the world at the time of its completion (Figure 3-81). In this work Clark used stained-glass and digital screen-print with images of the desert and classic figurative icons from Saudi Arabia, creating a vast visual panorama (Moor, 2006).

The *Stamford Cone* (Swiss Bank Cone) was executed in 1999 in Stamford, CT, USA by Brian Clarke (Figure 3-82). This stained glass sculpture was the largest free-standing glass structure in the world for that time (Clarke, n.d.). Brian about this work stated: "I want people to feel like they are stepping into the center of a sapphire" (Clarke, n.d.). He designed the Stamford Cone in 204 panels of the laminated mouth-blown glass in 14-meter-high with an internal illumination that reflects the screen by night (Clarke, n.d.).





Figure 3-80. *Victoria Leeds*. Brian Clarke. Leeds, England. 1990. 7,804 sq ft. ©2013-2020 Brian Clarke.





Figure 3-81. *Al Faisaliah Center*. Brian Clarke. Architect: Norman Foster. Riyadh, Saudi Arabia, 1999. 2,000sqm. ©The image is taken from *Colours of architecture* book page 102.



Figure 3-82. *Stamford Cone (Swiss Bank Cone)*. Brian Clarke. Stamford, CT, USA 1999. ©2013-2020 Brian Clarke.

In July 2017 I visited Brian Clarke's exhibition in Heni Gallery in London which presented twelve individual panels that every screen reveals the kinetic nature of the glass (Heni Gallery, n.d.). It was amazing to see such an influential technique and combination of forms and colors in each work (Figure 3-83). The artist reveals a world of energetic vivacity. Each composition traverses the twelve individual panels that form every screen and reveals the kinetic nature of the glass. Besides a powerful expression of screen panels, the reflection of the colorful shadows of each work on the wall and ground created a unique experience for the audience.

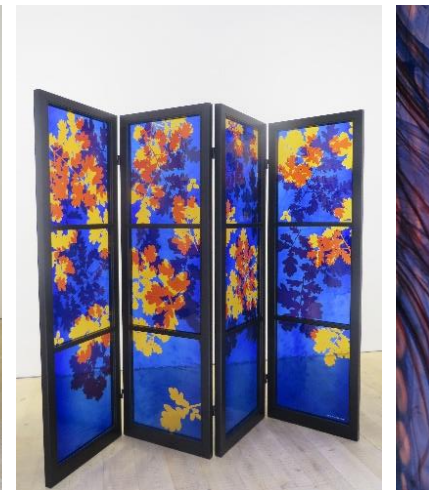
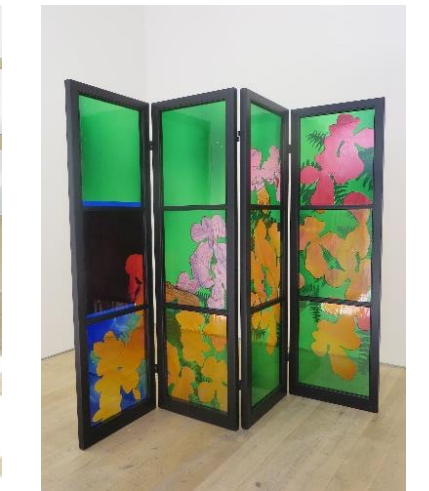


Figure 3-83. Summer Solstice Screens. Images of screen panels of Brian Clarke's exhibition in Heni Gallery in London, UK. 22nd June –30th July 2017. ©Parinaz Faghihi, July 2017.



### 3.7.6 David Pearl and Amber Hiscott

Amber Hiscott was born in Swansea, England. Between 1972-1975 she studied in the Architectural Glass department of Swansea College of Arts (Stained Glass in Wales, n.d.).

Amber Hiscott installed a glass sculpture called *Quatrefoil for Delius* (Figure 3-84) in Exchange Square in Bradford West Yorkshire England in 1993 (Hiscott, n.d.). This public glass art is a remarkable tribute to the English composer Frederick Delius who was born (1862-1934) and grew up in Bradford, England. This sculpture represents Delius's favorite theme, the recurring cyclical energy of nature. You can walk through the corpse-like shadowy skeletal structure and pause to reflect in the central pool of colored light. The colorful glass leaves in the middle of a leaf structure, remind birth in the middle of death while each death could be a symbol of birth.



Figure 3-84. *Quatrefoil for Delius*. Amber Hiscott. Exchange Square, Bradford West Yorkshire, UK. 1993. ©David Pearl and Amber Hiscott.

She has created most of her ecclesiastical and public glass art commissions in cooperation with David Pearl. David Pearl was born in 1952 is a British glass artist who studied at Swansea College of Arts from 1975-7 (Stained Glass in Wales, n.d., David Pearl).

David Pearl and Amber Hiscott's partnership extends the technique of enameling and slumping to the design, production, and installation of dramatic architectural features. The



combination of Amber Hiscott orientation to painting with the form and material interest of David Pearl led to technical innovation and was responsible for the expressive use of bold abstract hand-applied enamels. One of their partnership examples is *Glass towers & fountains* (Figure 3-85) at Bute Square in Cardiff-Wales (2000). This free-standing glass sculpture/public glass art is executed in two-colored cylinders, each of which is 35 feet tall and has been made of curved laminated and toughened glass on stainless-steel. This work has an industrial and constructive quality by restraining the decorativeness of colored glass (Faghihi, Almeida, Quintas, 2015).

*Razor Shells* (Figure 3-86) in Callaghan Square, Cardiff with 4.1-meter-tall which was made from 32 panels of silk-screen printed, kiln-shaped, toughened, and laminated 20 mm glass (Cummings, 2009).



Figure 3-85. *Glass towers & fountains*. David Pearl and Amber Hiscott (collaboration). Bute Square, Cardiff, Uk. 2000. © David Pearl and Amber Hiscott.



Figure 3-86. *Razor shells*. David Pearl and Amber Hiscott. Callaghan Square, Cardiff, UK. 2008. H. 4.1m, W 2.75m. © David Pearl and Amber Hiscott.

### 3.7.7 Cate Watkinson

Cate Watkinson was born in 1964, in Leeds, England. Since 1988 Cate Watkinson has been working as a glass artist and designer. She got her BA and PhD degrees from Sunderland University and is currently teaching architectural glass in this institution, being the head of the Glass and Ceramics Ma program. Over 30 years, she has executed architectural glass art, public glass art, and sculptural glass art pieces throughout the UK.

*LookOut* is one of her stunning glass sculptures in the shape of a sweet jar that was installed in 2004 on the SW corner of the roof of the MetroCentre's Debenhams store Gateshead (Figure 3-87, Figure 3-88). The 7-meter-high glass and stainless steel structure was executed in collaboration with Washington based company Architectural Metalworkers Ltd and the glass produced by Peterlee Glass and Co. Ltd. (PLG) (Watkinson, 2013).



Figure 3-87. *LookOut*. Cate Watkinson. SW corner of the new development of the MetroCentre, Gateshead, UK. 2004. ©Cate Watkinson.



Figure 3-88. *LookOut* at Night. ©Cate Watkinson.

The artist Cate Watkinson considered some significant items in designing the Look Out artwork, such as: the history of the place; the context of the commission (why the work is

being commissioned and for whom); function of the artwork; lightening; structural and technical issues; and, architectural space where work is to be sited (Watkinson, 2013, pp. 73-74). All of the considerations that Cate took in her design, was resulted in a noticeable artwork that can be seen from the nearby highway and acts as a sign for the new development of the MetroCentre, Gateshead.



Figure 3-89. *Baltic Butterfly*. Cate Watkinson and Vanessa Cutler. Baltic Business Quarter, Gateshead, UK. 2009. ©Cate Watkinson.

Another example of her glass art in public spaces is *Baltic Butterfly* in 2009 which is a collaboration between Cate Watkinson and Vanessa Cutler<sup>115</sup> (Figure 3-89). In this series of street furniture and public sitting, recycled glass/ceramic material and waterjet cutting are used. An interview was conducted with Vanessa Cutler on the 25<sup>th</sup> of June 2020 and she was asked “why do you think the Baltic Butterfly was not vandalized during the last 10 years?”. She explained that we cannot control vandalism, it is about the people, maybe it was by the luck or because people of that area liked the design (Cutler, personal communication, 25 June, 2020). Later on the 9<sup>th</sup> of July 2020, an interview was conducted with Cate Watkinson and she explained that artistically, the most important consideration of installing glass art in public

---

<sup>115</sup> Dr. Vanessa Cutler is a glass artist and waterjet specialist. She was a Senior Lecturer and MA program director in Swansea School of Glass. She has got her BA(Hons) in Glass with Printmaking and MA Glass in Wolverhampton University, and PhD in Sunderland University.



spaces is what the piece will do with the light. Therefore, the context and siting of the work in artistic vision are important. She added that, practically, the important issues are if the artwork is safe-breaking? are there any edges that people can skate-boarding on? do we need to cover the edges of the artwork where the most easily broken parts are (Watkinson, personal communication, 9 July, 2020).

Other examples of Cate's public glass art are *Total Policing* in Northumbria Police Head Quarters North Tyneside (2011); *Helping Hands* sculpture in collaboration with Colin Rennie in Cramlington Emergency Hospital (2015); and *Tall Trees* (Figure 3-90) which is a landmark sculpture for Albert Road, Southsea in collaboration with Vanessa Cutler (2016).



Figure 3-90. *Tall Trees*. Cate Watkinson and Vanessa Cutler. Albert Road, Southsea, UK. 2016.

# Chapter 4: Debates on The Improvement of Public Glass Art in Urban Contexts

## 4.1 Public Glass Art Obstacles and How to Overcome Them

There have been considerable debates on installing glass art in public spaces since the 80s, when public art became prominent. Durability and glass fragility raised concerns about using glass as an artistic material in public spaces. The innate nature of glass as a fragile material worries some city authorities to commission public glass art and makes a majority of artists to stay away from imagining and creating public art for public spaces with this material. Nevertheless, it should be mentioned that other materials are also easy to break or damage, but still used in the creation of public art pieces. For example, wood is easy to burn, fiberglass or plastic is easy to break, ceramics is also fragile but used more often in the creation of public art projects as opposed to glass. In Portugal (especially in Lisbon, Porto, and Caldas da Rainha), there are many ceramic public art sculpture and panels (installed outdoor) that are created by artists such as Maria Keil<sup>116</sup> (Figure 4-1), Eduardo Nery<sup>117</sup>, Luis Pinto Coelho<sup>118</sup>, Joao Abel Manta<sup>119</sup>, Fernando Fragateiro<sup>120</sup> (Sabo, & Falcato, 1998) (Nery, 2007), Joana Vasconcelos (Figure 4-2), and Virgínia Fróis<sup>121</sup> (Figure 4-3) (Vicente, & Fróis, 2017).

---

<sup>116</sup> Maria Keil (born in Silves 9 August 1914- Lisbon, 10 June 2012).

<sup>117</sup> Eduardo José Nery de Oliveira (Figueira da Foz, 2 September 1938 - Lisbon, 2 March 2013).

<sup>118</sup> Luís Braamcamp Freire Pinto Coelho (Lisbon, January 26, 1942 - Madrid, November 4, 2001).

<sup>119</sup> João Abel Manta (born 1928 in Lisbon) is a Portuguese architect, painter, illustrator and cartoonist.

<sup>120</sup> Fernanda Fragateiro (Montijo, 1962).

<sup>121</sup> Virgínia Fróis (1954), Professor at FBAUL.





Figure 4-1. *O Mar*. Maria Keil. Av. Infante Santo, Lisbon, Portugal. 1958-59. ©Salt of Portugal.



Figure 4-2. *Pop Galo*. Joana Vasconcelos. Built-in 2016. Collection of the artist. Exhibited in 2020 Beyond, Yorkshire Sculpture Park, Wakefield; 2018 I'm Your Mirror, Guggenheim Museum Bilbao; 2017 Bauhaus Square, 798 Art District, Beijing; 2016, Avenida Ribeira das Naus, Lisbon. 900 x 372 x 682 cm ©Joana Vasconcelos.



Figure 4-3. *Monumento ao Associativismo*. Virgínia Fróis. Alameda Guerra Junqueiro, Portugal. 1994.

To understand why glass is not used so much in public places, several interviews were conducted with glass artists and they were asked about their opinion on why glass art is used less in public spaces than the other materials. On the 22<sup>ed</sup> of June 2020, Jeffrey Sarmiento was one of the artists interviewed. He stated that safety is the number one concern to do public art commissions. He explained that because glass is a fragile and quite brittle material, (for example, vulnerable to the sun), the artist may use glue to make glass strong and safe; but he cannot predict how this adhesive will react to different weathers. Therefore, even with glue, glass could be fragile. For this reason, artists employ glass less than other materials in their public art commissions. He also added that laminating or gluing elements on the sculpture, using kind of back supportive components make the glass a bit sturdier in the composition, taking some advice from either engineers or other industry experts could help to the viability of glass sculptures in public spaces (Sarmiento, personal communication, 22 June, 2020).

In an interview we have conducted with Vanessa Cutler on 17<sup>th</sup> of June 2020, she was asked for her opinion about what are the reasons that the number of public glass art is less than other public arts. She explained that in many countries glass is considered a delicate material but in the UK they rely on the same artists that produced a good result on glass projects. she said:

People seem unwilling to pay for design work and the culture of commissioning is to ask for much research work in the application without any payment. It is a culture of something for nothing. Large commissions those choosing or paying have an idea of who they want to commission. Culture wise we have become more about the procedure and that stops many aspiring or good artists from applying. Additionally, there are fewer commissions and that is due to politics and education (Cutler, personal communication, 17 June, 2020).

Vanessa Cutler pointed to the need for policy support and education to improve public glass art commissions. These are the significant issues that we focused on in this thesis.

Meanwhile, contemporary glass artists have proven that glass has the ability to be used in public places as much as any other material considered more resistant, like metal and stone,

as we demonstrate in chapters 2 and 3, were several examples of glass art in public spaces were studied.

There are different concerns about installing public glass art that are discussed here. First, *vandalism* and approaches toward preventing the vandalism of public glass art are investigated. The second issue that is discussed in this chapter is the role of education in the improvement of public glass art. In this section, vandalism is defined, successful, and unsuccessful case studies and prevention approaches that were used before and are now being used are reviewed. The role of education on the improvement of public glass art is discussed from different angles, such as education for reducing vandalism, training artists to learn glass art techniques, and educating the general public to accept and appreciate public glass art pieces. Moreover, glass art education in Portugal, Iran, and Great Britain are reviewed. Finally, the improvement of glass art in public spaces in Portugal, Iran, and Great Britain is discussed.

## 4.2 Vandalism

Many researchers are trying to answer what is vandalism<sup>122</sup> and how to cope with that in art? What gets vandalized and why? What is the cost of damaging the artworks? What can be done to stop or at least reduce vandalism? It is not easy to answer these questions while vandalism may happen everywhere and everything may get vandalized such as artworks, archeological sites, cars, street signs, phone booths, among many other objects.

According to Roos, vandalism is a social attitude from individuals with the gesture of *negative honor* which reflects a complex of feelings (Roos, 1992). In the Oxford English dictionary vandalism is defined as “the crime of destroying or damaging something, especially public property, deliberately and for no good reason”. In fact, a vandal does vandalism purposefully (it could be untargeted or with a target) to destroy or damage something that is attractive or belongs to public property. In this definition, two elements clarify vandalism: *damaging public property* and *doing it deliberately*. These two elements indicate two very

---

<sup>122</sup> Vandalism comes from the word Vandal, a German tribe. The *Vandals* were a Germanic tribe who are first mentioned in Roman history in the Natural History of Pliny the Elder (77 CE) (Mark, 2014).

important factors for the incidence of vandalism; the first is **strong inner motivation** and the second is **situational opportunities** (Cruz, 2019).

Willem van Vliet has an article called *The cherry question or the role of social science research in designing against vandalism* (Van Vliet, 1992) which was published in *Vandalism: Research, Prevention, and Social Policy* book (Christensen, Johnson, & Brookes, 1992). In this article, he describes the role of research in designing against vandalism. Van Vliet states that vandals are in rural areas and suburbs as well as inner cities, among middle-class, working-class families, and in all ethnic groups. Despite this, in the real world, vandalism does not occur everywhere, and in places where it does happen, it doesn't necessarily happen all the time. Therefore, public places with less surveillance and security are more vulnerable to vandalism because vandals have the opportunity to commit the act of vandalism. For this reason, some environmental designers may suggest:

let's just take away the opportunity and no more vandalism will occur. The problem with this approach is that not each and every opportunity can be eliminated, and motivation still exists. In fact, evidence suggests that motivation generates its own opportunities (Van Vliet, 1992, p. 46).

Gabriel Moser is a social psychologist who explains vandalism could appear as the mirror of a bad social climate<sup>123</sup> (Moser, 1992). He said if the government or institution places little value on people who work or live there and give them poor satisfaction; therefore, some people in a neglectful behavior toward the institutional environment react as a consequence by vandalizing objects that symbolize the society in which they live (for example by vandalizing subway seats, ransacking parks, breaking or destroying public arts). Moser added: "These acts give a feeling of domination over a hostile environment, leave scars on it, and allow the actor to gain regard among peers" (Moser, 1992, pp. 57-58). If the government raises the degree of responsibility that different publics are willing to extend and sustain in the name of art, vandalism would be reduced (Doss, 2016).

---

<sup>123</sup> **Social climate**, typically defined as the perceptions of a **social** environment that tend to be shared by a group of people.

Vandalism is not a new phenomenon. It has a long history as several years ago, in 1982, Jim Wise states that the first vandalism occurred in the garden of Eden with the human foot. The tombs of Egyptian pharaohs were vandalized acquisitively, and the ruins of Pompeii contain evidence of graffiti (Wise, 1982). Nowadays we are witness to vandalism in public arts. The incident follows in a long tradition of people harming artworks in protest. But works of art have also been vandalized by accident, by overzealous fans, and even for no apparent reason at all.

Hans-Edvard Roos (1992) argued that the interest in the motivation for vandalism concentrates attention on a psychological problem and vandalism is an expression of *human drives*<sup>124</sup>.

Many researchers are unanimous in their studies that the best way to stop or at least to reduce vandalism is an anti-vandalism program. To support an anti-vandalism program, we need to have a strong theory to understand why vandalism happens (Vliet, 1992; Winter, 1992).

When Rosemary A. Winter was the manager of the metro awareness program in the Washington Metropolitan area transit authority, did research to design an anti-vandalism package to reduce or eliminate graffiti and vandalism in that area in 1992. (Winter, 1992) The result of her research concentrates on three basic elements: **Education, Enforcement, and Elimination.**

In *Vandalism: Research, Prevention, and Social Policy* book, she has an article that described the organization of a series of **educational** workshops for different groups of people who were successful to reduce vandalism. For this part, she organized a series of workshops for students at age 5 to 9, and a slide show presentation for students in fourth grade through senior high. Younger students (5-6-year-old students) saw a ten-minute slide show that contains a message that a clean system depends on them and they are a part of the system that owns it when they pay their fares. Also, each student received a *Think metro- Think safety*

---

<sup>124</sup> This theory defines four powerful and innate human drives that motivate all discretionary behavior. Those human drives are including: 1. Acquiring- 2. Bonding- 3. Learning- 4. Defending. All humans possess the four drives but different individuals may engage some or all of the drives to different degrees. Some individuals may favor one or more of the drives, such as a very friendly, warm-hearted person who favors the bonding drive, or a very combative, defensive person who favors the defending drive.



button or *Help keep metro keep clean* pencil to serve as a reminder of the visit. The older students (8-9-year-old students) saw a 20-minute slide presentation providing them with an overview of the region's transit system, an explanation of who owns it, how much the equipment costs, and the safety measures to be followed when using the system.

Moreover, students were shocked to learn that they may be arrested for writing on a seat and they could get a police record if they were arrested for the destruction of property. This was the second factor for the anti-vandalism program: **Enforcement** that makes teenage students understand and obey the law about vandalism. A court system that is backed up with other serious crimes could be a generic example of the implementation of the anti-vandalism program. Rosemary A. Winter suggests that could be more effective if police arrest vandals and send them to court. Then the judge doesn't allow Vandals who are first offenders to go free, they sentence to a four-hour class which is an educational course that includes presentations by the court, the transit police, bus services, rail, and facilities maintenance. By attending, offenders do not have the arrest on their records and are given a second chance. This method has proven to be very successful.

The last step to take is **elimination**. This factor explains that as soon as vandalism is reported, it should be removed all damages as quickly as staff and material would permit. This element operates under the theory that graffiti breed graffiti and the hardest mark to make is the first one. Rosemary A. Winter reports after implementation of the anti-vandalism program with considering those aforementioned three factors (education, enforcement, and elimination), they were witnessed a %66 decrease in incidents of vandalism in Metrorail during the first seven months of executing the program (Winter, 1992).

Besides education, enforcement, and elimination, there are more approaches to prevent the act of vandalism which is addressed in the next section.

#### **4.2.1 Techniques to Prevent Vandalism in Public Glass Art**

Brian Wheeler in BBC News Magazine on 23 January 2013 stated: "Vandalism in the UK is falling at a quicker rate than almost any other type of crime, according to official figures". In his article, he points to several issues as approaches toward preventing vandalism such as immediate elimination of vandalism, enforcement, providing diversionary activities for young

people, having a crackdown on underage alcohol sales, role of smartphones and social media, and finally, the effect of removing lead from petrol on the reduction of violent behavior of the people (Wheeler, 2013).

In addition to the aforementioned approaches, more methods can effectively reduce vandalism which includes the theoretical anti-vandalism program, educational program, offering anti-vandalism programs and slogans on mass media, enforcing people to respect the anti-vandalism laws by a court system, eliminating vandalism as soon as it is detected, safeguarding techniques, choosing a proper site for the installation of a glass piece, site protection, cleanness of the site of Public art, and creating back up pieces of glass. Meanwhile, in an ideal liberal society, Art in public spaces is a part of the urban context, therefore, it suffers the consequences of interaction with the population. To reach a liberal society, education is the most helpful issue. In the creation of public glass art, artists must consider the possibility of vandalism, and incorporate either the avoidance or the embrace of it into their design. Despite there is no certain way to create a vandal-proof environment and a trace of uncertainty always exists, any anti-vandalism program is nonetheless a valuable and fully effective approach.

- 1) **Theoretical anti-vandalism approaches.** One technique to reduce vandalism in public glass art is to define a theory to understand why vandalism happened. Theoretical explanation of vandalism could be describing the concept of age-status conflict, the esthetic experience that vandalism provides for vandals, and how vandalism could reduce or moderate the burden of perceived inequities and injustice for vandals (Van Vliet 1992; Winter 1992). A study on the culture of citizens residing around and passing through the location of public glass art, as well as the topology analysis of the area, may also help to offer theoretical anti-vandalism solutions for each particular location.
- 2) **Education.** Art education and general public workshops are addressed in this thesis as solutions for preventing vandalism:
  - a) Art education helps artists to study art history, as well as innovative artworks, techniques, art concepts, and creative ideas. With this knowledge, an artist can think and create an artwork in a growing trend, especially when he/she wants to create a public art piece for contemporary society (see Section 4.3 for more discussion).

b) Subsidiary programs and workshops for the general public are also helpful to prevent vandalism, mainly for teenagers since vandalism is more likely to happen at these ages. These programs and workshops can enlighten the general public about how an artist creates and installs a piece of glass artwork and how much the artwork costs or adds value to society. These workshops provide the general public with practical experiments with glass or participation in creating artworks. Therefore, these workshops could convey a sense of owning public properties by every person in the community, so, the community will protect and care more about the public properties.

3) **Anti-vandalism programs and slogans on mass media:** Advertisements in mass media with an anti-vandalism motto is another way to illuminate people's thoughts. Brian Wheeler stated: "Vandalism began to fall sharply in 2006/07 - about the same time as smartphone sales began to take off in the UK .... 7% of teenagers spent less time socializing with friends since they got a smartphone." He described that nowadays,

teenagers don't waste their time vandalizing when they could on their BB [Blackberry] talking to girls or on YouTube putting up their music videos. They have got a lot of things to keep them occupied. They don't need to be bored now.... The average 11- to 14-year-old spends 13 hours a week playing computer games, increasingly on their smartphones and GameTrak<sup>125</sup> (Wheeler, 2013).

These statements proved that nowadays the vandalism risk is reduced due to absorbing people on social networks, where they relieve their inferiority complex. Therefore, embedding educational concepts, and anti-vandalism mottos on mass media and social networks where people spend much time could be helpful besides other solutions.

- **Enforcement.** Making laws about vandalism and persuading people to follow the rules is a helpful step that is already adopted in the constitutions of many countries. A court system backed up with serious crimes can greatly reduce the act of vandalism. Also, it may be helpful to provide an awareness system for students (mainly teenagers) and let them know if they commit the act of vandalism, they could get arrested and get a police record or have to do voluntary work instead of being arrested.

---

<sup>125</sup> **Gamettrak** is a brand of 3-dimensional game control systems based on position tracking, designed for home video game platforms.

- **Elimination.** Quickly report the damages in public arts and immediate elimination of these damages prevents the chance of spreading the vandalism over the city. It is recommended to repair the damaged properties as fast as possible, as vandalized property can attract people who might cause more damage. For example, the public art *A Linha de Mar (The Line of the Sea)*, by Pedro Cabrita Reis<sup>126</sup>, was vandalized shortly after it was inaugurated in 2019 in the area of Leça da Palmeira, on the outskirts of Porto (Figure 4-4). According to Archyde the aggressive graffiti that has led to a police report was: “A shame,” “With our taxes,” “300,000 euros,” which is a clear reference to the controversy raised by the cost” (Archyde, 2020). As soon as the police got the report, removed the graffiti, and clean the artwork.

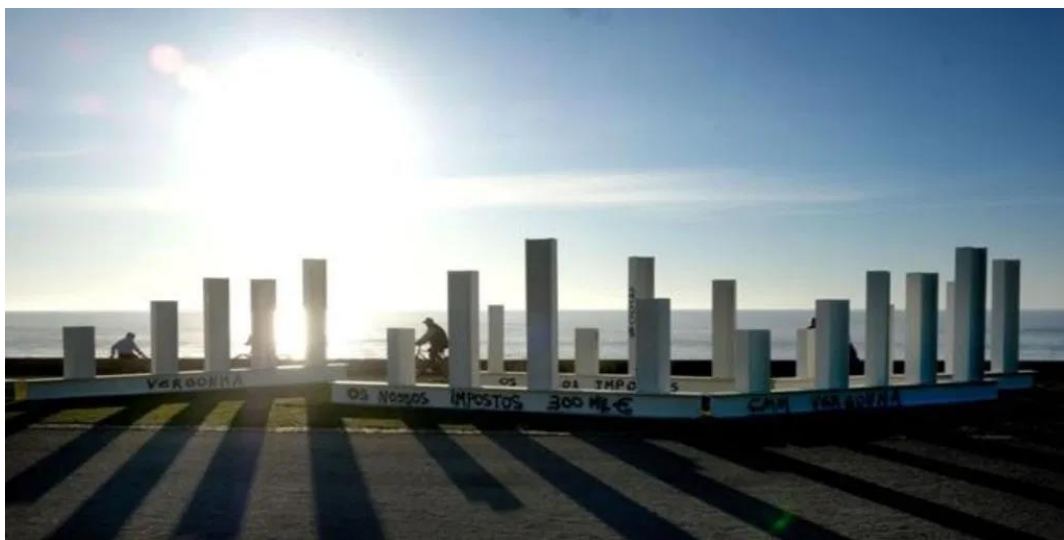


Figure 4-4. *A Linha de Mar (The Line of the Sea)*. Pedro Cabrita Reis. Porto, Portugal. December 2019.

- **Safeguarding techniques.** Artists should be trained or acquire enough knowledge about safeguard techniques, as this is an important issue for those who want to create public glass art. Andrew Moor believes that is necessary to make strong glass objects to install in public areas and he argues “I always remind clients that everyone can walk down a high street and break every shop window. But they do not. An external public glass artwork needs to be robust and in a well-lit public space” (Moor, personal communication, 12 August 2016).

---

<sup>126</sup> Cabrita Reis is one of the great names of contemporary art in Portugal.

Techniques for safeguarding the glass are heat-strengthened, toughened or tempered glass, and lamination which helps the glass to be less likely to break, and less prone to inflicting injury when it breaks <sup>127</sup> (the techniques are addressed in section 2.3.4, Chapter 2).

- **Glass artworks site.** Another issue is to choose a proper location for the glass piece installation. To create a dialogue with the audience, artists are required to take into account the site and scale where the artwork is going to be displayed. The artist should consider whether the visitors are pedestrian or pass by a vehicle, whether the site is located in the commercial, cultural, historical, or educational area, and the culture of people who reside permanently near the site of the artwork.
- **Site protection.** Protect the artwork site by installing devices such as a CCTV (closed-circuit television camera), or employing a security guard, is also an effective approach to prevent vandalism. Moreover, it is recommended to put a sign to alert people that the place is under security control, or there is a CCTV installed which recorded everything.
- **Cleanness of the site of Public art.** The cleanness of the site helps the artwork to better resist the act of vandalism. Andrew Moor says, “Nothing deters vandalism more than the clean presentation of a site” (Moor, personal communication, 12 August 2016). In the meanwhile, a clean and tidy property creates a sense of responsibility than a messy property. Therefore, a clean site of public art, reduce the risk of vandalism.
- **Back up of pieces.** Creating back up pieces of glass for each part of the artworks, in which if one part is broken, it could be easily replaced with the other pieces, can also help to reduce the chance of vandalism. Edvin Öhrström is a Swedish glass artist who devoted most of his life to educating glass art and teaching in fine arts universities. He developed his sculptures to prisms of gemstone colors that played with light reflections and refractions in the glass. *Crystal*, the vertical accent in glass and steel by Öhrström, is a glass obelisk installed in Sergel Square in Stockholm with 37-meter-tall (Figure 4-5). It has been made from steel and covered with glass which has four lamps inside the obelisk as a light source. Öhrström states the idea of building extra parts of his glasses to substitute if other parts broke.

---

<sup>127</sup> Different equipment and kilns in a factory are needed to produce the glass, toughened/tempered and heat-strengthened, as it is not practical to do it manually in glass workshops





Figure 4-5. *Crystal*. Edvin Öhrström. Vertical accent in glass and steel. Stockholm, Sweden. 1979.

#### 4.2.2 Successful Case Studies of Glass Art in Public Spaces

The materials used in public art installations are of vital importance in expressing artists' thoughts, motives, and emotions, and are determinant for the successful accomplishment of the project. In this context, the glass could become an appropriate medium for artists to work with light (artificial or natural) and color to create distinctive artworks. In several countries around the world, we witness an increase in using glass art in public spaces. In this section, we present examples of successful public glass arts.

Shan Shan Sheng is a Chinese artist who came to the United States in 1982 to continue her education and artistic interests. She attended Mount Holyoke College and the University of Massachusetts at Amherst and got her Master's degree in Fine Arts. Then she stayed for 2 years at Harvard University as an artist-in-residence. She spent most of her professional life (18 years out of 25 years of professional life) working in the public art field and completed

more than 30 large-scale projects in different cities of United States as well as in China, Taiwan, England, Italy, and other countries<sup>128</sup> (Sheng, n.d.-a).

*Blooming* (Figure 4-6) is the name of public glass art that Shan Shan Sheng produced in the city of Shenzhen, China 2017. In this project, a team of public art organizers, glass fabricators, programmers, engineers, and designers from China, the U.S., and Germany worked together. *Blooming* consists of nearly 500 architectural art glass panels, 8.8 (29ft) meters high 8.5 (27.5ft) meters long, and 7.3 (23ft) meters long, dazzling colors bring dynamic visual impact. LED lighting systems are integrated into each panel controlled by a mobile app. This project is created and installed with a budget of \$1,320,000 (Sheng, *Blooming*). Sheng also created other public glass arts such as *Open Door* (Figure 4-7), *Open Wall* (Figure 4-8), *Ocean Wave I&II* (Figure 4-9), *Abacus* (Figure 4-10) (Sheng, n.d.-a, n.d.-b).

In the project *Blooming*, Sheng created an abstract sculpture with bright colorful organic columns using glass techniques accentuating the lighting devices, helping to create an atmosphere that is likely to prevent the artwork from vandalism. In most of Sheng's public glass art project, she used a suitable place and lighting to prevent vandalization. For example, to prevent vandalism in the *Ocean Wave I&II* project, the glass panels are out of access and the area is under special surveillance (it is in Cruise Terminal COUNTRY). For instance, in public glass art, *Open Door* which is installed in Lorain County Community College COUNTRY, the site itself had an intense lightning which appears to deter the vandals. *Open Door* is located in an open area where educated people frequently walk around.

---

<sup>128</sup> For more information, please check the artist website on [www.shanshansheng.com](http://www.shanshansheng.com)



Figure 4-6. *Blooming*. Shan Shan Sheng. Shenzhen, China. 2017. ©2020 CODAworx.





Figure 4-7. *Open Door*. Shan Shan Sheng. Lorain County Community College, Elyria, Ohio, United States. 2016. ©Shan Shan Sheng.



Figure 4-8. *Open Wall*. Shan Shan Sheng. 53rd Venice Biennale 2009, Venice, Italy. 2009. ©Shan Shan Sheng.



Figure 4-9. *Ocean Wave I&II*. Shan Shan Sheng. Port of Miami, Cruise Terminal D. Miami, Florida, United States, Cold casting translucent panels Suspension Sculpture, 38 x 210 x 40 ft. 2007. ©Shan Shan Sheng.



Figure 4-10. *Abacus {1046-771 BC}*. Shan Shan Sheng. Glassfever Exhibition, Dordrecht, Netherlands. 2016. Hand Made Venetian Glass, Stainless Steel, Wood. Dimensions 15 x 8 x 3 ft. ©Shan Shan Sheng.

Another important reference is Dale Chihuly<sup>129</sup>, a significant glass artist who was born in 1941, Tacoma, Washington. He is a famous American glass artist whose large scale blown glass sculptures are outstanding. Since 1965, Chihuly was educated in arts and earned a lot of experience working with glass and he has implemented several glass art projects and held many exhibitions in the United States, Italy, Israel, UK, Netherlands, Canada, Singapore, and United Arab Emirates. During the 1980's he started to create a series of glass artwork and have been repeated throughout his career. *The Baskets, Glass on Glass, The series: Seaform, Macchia, Soft Cylinder, Persian, Venetia, Putti, Rotolo, and Ikebana and Light drawings* are the works that he did (Clay, 2018). Here, some of Chihuly's works in England are just indicated as successful examples of glass art in public spaces:

- London's Royal Botanical Garden, Kew: Kew Garden is a botanical garden near London founded in 1840 and included more than 30,000 different kinds of plants. From May 27<sup>th</sup>, 2005 to January 6<sup>th</sup>, 2006, Chihuly for the first time exhibited in the UK his series of colorful glass blown sculptures (Figure 4-11). Chihuly's glass-blown works and installation in Kew Garden were greatly welcomed and were seen by 860,000 people. Chihuly designed the whole garden to respond to the architecture, variety of the plants, and spectacular scenery of Kew. Every piece of the glasses was set within the landscape. His spectacular garden cycle is begun in 2001 at Garfield Park Conservatory in Chicago and later he exhibited his Botanical Garden series in more than 10 Gardens in the United States (Diane Farris Gallery, n.d.), (Chihuly, n.d.).

---

<sup>129</sup> Dale Chihuly graduated from the University of Washington in 1965 with a Bachelor of Arts degree in interior design (Clay, 2016). He started experimenting with glass-blowing in 1965 and got the full scholarship from University of Wisconsin-Madison under supervision of Harvey Littleton, who established the first glass program in the United States at the University. In 1967 he received a Master of Science degree in sculpture, then, he enrolled at the Rhode Island School of Design and got the Master of Fine Arts degree in sculpture from the RISD in 1968. Later he got the Louis Comfort Tiffany Foundation grant for his work in glass, as well as a Fulbright Fellowship (Kuspit, 1997). Therefore, he traveled to Venice and Island of Murano and first saw the team approach to blowing glass (Chihuly, n.d.).



Figure 4-11. Day and night in Chihuly's exhibition at Kew Garden. Dale Chihuly. Southwest London, England. 2005. ©Dale Chihuly.

- Entrance chandelier of Victoria & Albert Museum: One of Dale Chihuly's glass sculptures as a chandelier on a very big scale ( $8.2 \times 3.7 \times 3.7$  m) hanged under the glass rotunda at the entrance to the Victoria and Albert Museum in London (Figure 4-12). The Chandelier is more considered to be an Artwork than a source of light. The chandelier was completed in several stages and was not finished once; Chihuly installed the chandelier in 1999, then he decided to enlarge it to be in a current size. He added more glass blown pieces and finish it in 2001 (Oldknow, 2003) (Opie, 2001). This glass art cannot be considered as public glass art although it is accessible to the general public under security guard protection. This is just a sculptural glass art in a public space. Because it has more features of sculpture than features of public art.
- *The Sun*: *The sun* is the name of Chihuly's largest outdoor public installation in Berkeley Square, London exhibited in December 2014 which is consists of 1,300 hand-blown glass pieces (Figure 4-13). It has 5.5m in height and weighs 2000 kilos and took five days to install. This artwork was displayed in prestigious museums and gardens around the world such as the New York Botanical Garden (2006), de Young Museum (2008), the Salk Institute for Biological Studies (2010), and the Montreal Museum of Fine Art (2013) (Chihuly, 2014). *The Sun* is a public glass art because it has features of a public art piece; it is accessible to everybody in a public space although temporary, attracts and engages people's minds, creates an identity for the place where it is installed. The chosen locations for installing this piece, good lightning during the night, and its vivid design are strategies for preventing vandalism for this public glass art piece.





Figure 4-12. *The V&A Rotunda Chandelier*. Dale Chihuly. Victoria and Albert Museum, London. 2001. ©Andrew Dunn, 3 December 2004.



Figure 4-13. *The sun*. Dale Chihuly. Berkeley Square, London, England. 2014. ©Loco Steve.

There are other examples of successful public glass art such as *Blue Heart of Delft* of the artist Marcel Smink (Figure 4-14) in Delft Market Square which is situated to the north-east of the main Church entrance. It is symbolically representing the *Blue Pottery of Delft* in the Netherland. The *Blue Heart* is executed with a strong stainless steel structure (Figure 4-15) inside which keeps every component of the whole structure together and demonstrates a half-standing giant heart with a delicately curved shape in the middle of a small square. Moreover, its glass surface consists of several pieces of glass; this makes it possible to easily change the glass pieces in case of breakage. Also, its heart shape and iconic Delft Blue color make this work a symbol of the city to the visitors and tourists, therefore people are more likely to keep it safe.



Figure 4-14. *Blue Heart*. Marcel Smink. Delft Market Square, Netherland. 250×350×300 cm. 1998. ©Parinaz Faghihi. The photo was captured on 24.8.2019.



Figure 4-15. The Steel framework inside of Blue Heart. Delft. ©Parinaz Faghihi. The photo was captured on 24.8.2019.

Herman Lamers is a Dutch artist who was asked by the municipality of Zwolle to design a modern version of a statue of the archangel Michael (Figure 4-16) to be placed on the market square behind the church. He designed 3 meters, high glass angel, with 370 glass panels of 8mm on top of each other fixed with special glue (3M double side tape) which is resistant to outside conditions (rain, frost, wind). In this public glass art, the artist built a robust glass sculpture which is one of the Safeguarding techniques to preventing vandalism.

*Aden Tianjin China* (Figure 4-17) is another work of Lamers installed in Tianjin, China, which is located 150 km from Beijing. In Figure 4-17 we can visualize glass sculptures of solid and cubic hollow figures of a four-year-old boy, who shows the dreams and realities of the artist's childhood. The hollow figure is the image of the boy, which represents the artist's dreams. The sculptures are about 3.5 meters high. The positive sculpture is installed in the courtyard of the design agency office and the negative sculpture is installed in a park 25 minutes away surrounded by water.





Figure 4-16. *Archangel Michael*. Herman Lamers. Zwolle, Netherlands. 2010. 3mtr. High. © Herman Lamers.



Figure 4-17. *Aden Tianjin China*. Herman Lamers. Tianjin, China. 2016. 3.5mtr. High. ©White Box Art Center.

#### 4.2.3 Vandalized Case Studies of Glass Art in Public Spaces

Besides those successful examples of glass art in public spaces, some public glass art pieces were vandalized. João Silva is a Portuguese architect who had several temporary glass art installations. An interview was conducted in August 2016 concerning the public glass art that he made for Marinha Grande. João explained that he created 23 pieces of glass artworks (the technique was glass blowing and the pieces were all different from each other in the range of 40×50×60 cm dimensions) in 2006 with the collaboration of CRISFORM glassblowers. He installed his pieces in the lake of Marinha Grande museum's garden (Figure 4-18). João Silva states that:

to discourage people from vandalizing, we put additional street lighting in the area, we wrote in the local newspaper that the area is under special surveillance (even if it isn't), we also asked the police for more patrolling. However, it's difficult to control people's reactions. There's always a very high risk in public glass art

exhibitions that have no vigilance (Silva, personal communication, 14 September, 2016).

However, with all efforts on preventing vandalism, after one week of installation, teenagers broke 8 pieces with stones. Therefore, the artist and authorities of the Marinha Grande Museum decided to remove all the pieces from the location. The reasons behind this vandalism are indeterminate, nevertheless, at the first glance, we understand that the pieces were so fragile and its design was fascinating for the vandals to break the objects, as bursting soap bubbles appeal to people. Although vandalism may happen in public glass art, to reduce the risk of vandalization, artists are highly recommended to consider vandalism in their designs.



Figure 4-18. *Untitled*. João Silva. At the lake of the Marinha Grande city park, Portugal. 2006. ©João Silva.

Zora Palova<sup>130</sup> is a Czech artist who devoted most of her life to educating glass art and has also worked extensively to commission glass art in public spaces in Bratislava, Rotterdam, and Sunderland. She understands her medium and uses it with great simplicity and directness in sculptures that are abstract and compelling. Zora designed the monumental glass sculpture *Light Transformer* (Figure 4-19) for the national glass center in Sunderland which reflects the

---

<sup>130</sup> Zora Palova was born in Bratislava, Czechoslovakia, in 1947. She studied at the School of Applied Arts in Bratislava (1967) and taught at the Public School of Arts in Nitra (1969). She then resumed her studies at the Academy of Fine Arts, Bratislava, specializing in painting (1971) and later in glass and architecture (1975). She became President of the Association of Applied Arts and Designers in 1995 and Research Professor at the University of Sunderland in 1996. She has received many awards including the WCC Prize, Interplays 92, Bratislava and the Triennial Prix, Glass Sculpture Triennial, Nuremberg. Exhibiting widely throughout Europe, her sculptures are in many public and private collections around the world (Glass sculpture foundation, n.d.).

feeling of absurdity, inner conflict, or by contrast liberty and bravery. It was installed on the roof of the National Glass Centre in 1998. According to Balgava in 2005 this work was the largest work of cast glass in the UK weighing 1000 kilograms (Balgava, & Eliëns, 2005). The work was highly praised, not only by the general public but also by other glass artists. Despite the glass sculpture *Light Transformer* was unreachable, it was broken. It is not still obvious why and how it was vandalized; someone broke it for fun or vandalized it for a special reason.

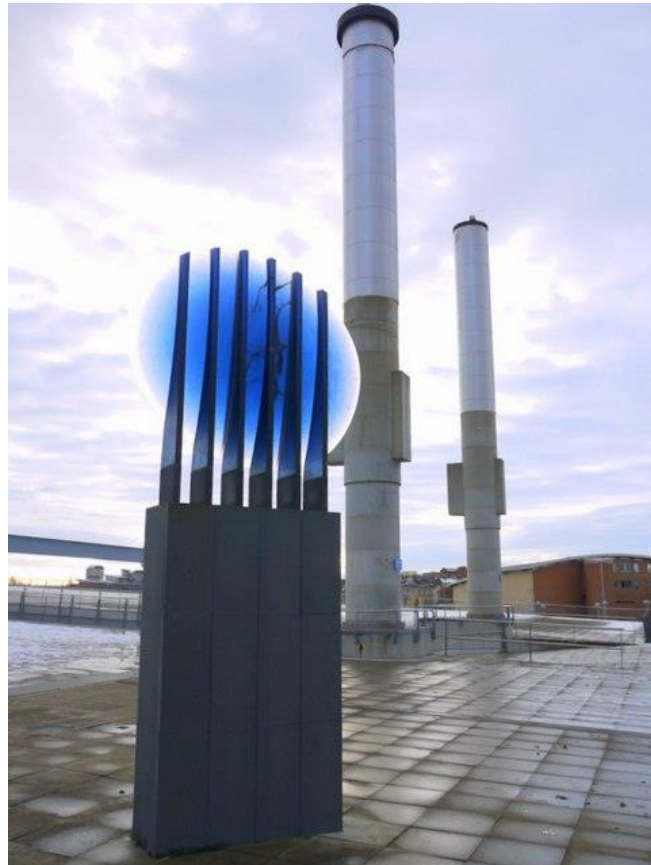


Figure 4-19. *Light Transformer*. Zora Palova. National Glass Center in Sunderland, England. 1998.

In April 2012 in Fafe<sup>131</sup> city, in the square of Luís de Camões Street, a new monument was unveiled in that roundabout (Figure 4-20). The monument, built of iron and glass by the Norchapa company, with the design of Rogério Almeida who won the contest for this public art (Coimbra, 26 April, 2012). It is a symbol dedicated to local power. This monument was

---

<sup>131</sup> Fafe is a small town in the northern Portuguese district of Braga.



designed in a way that on the glass the names of the local parishes and the Municipality of Fafe (all mayors' names of the past 38 years of Fafe), is written (Martin, 26 April, 2012) (Coimbra, 26 April 2012). Unfortunately, the glass itself is broken (Figure 4-21). The reason for the broken glass is not obvious if it is vandalized. But it could be related to the iron expansion and contraction when submitted to different temperatures, during the different seasons. In fact, this expansion had to be considered in the iron framework to prevent breakage.



Figure 4-20. *Monumento ao Autarca* (Monument to the mayors of Fafe). Rogério Almeida. Fafe, Portugal. 2012. ©Parinaz Faghihi.

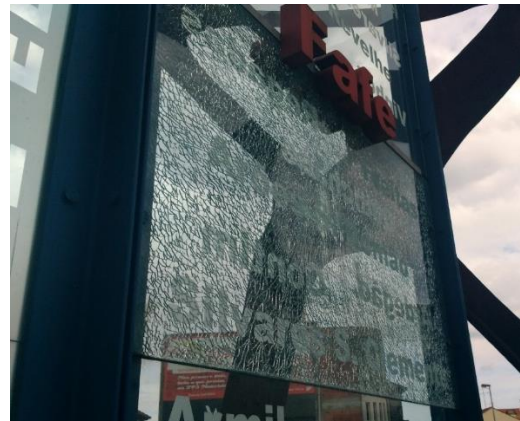


Figure 4-21. *Monumento ao Autarca* (Monument to the mayors of Fafe). Rogério Almeida. Fafe, Portugal. 2012. ©Parinaz Faghihi.

Although the design of the glass art piece, the glass type, and the technique used by the artist for the creation of her/his glass art pieces for public spaces are important factors to minimizing vandalism, vandalism may occur for no reason. However, prevention is always essential.

### 4.3 The Role of Education on The Improvement of Public Glass Art

A profusion of international strategies including the Millennium Development Goals (MDG)<sup>132</sup> 2015, the Education For All (EFA)<sup>133</sup>, Sustainable Development Goals (SDGs) 2030<sup>134</sup>, and Education 2030<sup>135</sup> affirmed that education is an important scope of development (Glenn 2011, p. 7). In all of the aforementioned agendas, 'Education' is placed among the most important items and is put into priority. Because, through education, people can break the cycle of poverty, reduce inequality and reach gender equality, live in healthier and sustainable life and create peaceful societies (United Nations, n.d.).

Meanwhile, education, in general, is crucial, academic art education and pedagogical programs on the path to the development of societies have a special place to promote appreciation of diversity and richness of cultures, developing an individual's personality and strengthening social cohesion.

---

<sup>132</sup> The Millennium Development Goals (MDGs) were the eight international development goals for the year 2015 that had been established following the Millennium Summit of the United Nations in 2000, following the adoption of the United Nations Millennium Declaration. All 191 United Nations member states at that time, and at least 22 international organizations, committed to help achieve the following Millennium Development Goals by 2015: (1) to eradicate extreme poverty and hunger; (2) to achieve universal primary education; (3) to promote gender equality and empower women; (4) to reduce child mortality; (5) to improve maternal health; (6) to combat HIV/AIDS, malaria, and other diseases; (7) to ensure environmental sustainability; (8) to develop a global partnership for development.

<sup>133</sup> Education for All (EFA) is a global movement led by UNESCO (United Nation Educational, Scientific and Cultural Organization), aiming to meet the learning needs of all children, youth and adults by 2015 (UNESCO, G, 2015). UNESCO, G. (2015). Education for all 2000–2015: Achievements and challenges. EFA Global Monitoring Report, 500.

<sup>134</sup> The Sustainable Development Goals (SDGs) (or Global Goals for Sustainable Development): By the background of (MDGs), the United Nations set 17 global goals in September 2015, with principle of "leaving no one behind", the new Agenda emphasizes a holistic approach to achieving sustainable development for all. The 17 sustainable development goals (SDGs) to transform our world: (1) no poverty; (2) zero hunger; (3) good health and well-being; (4) quality education ; (5) gender equality; (6) clean water and sanitation; (7) affordable and clean energy; (8) decent work and economic growth; (9) industry, innovation and infrastructure; (1) reduced inequality; (1) sustainable cities and communities; (1) responsible consumption and production; (1) climate action; (1) life below water; (1) life on land; (1) peace and justice strong institutions; (1) partnerships to achieve the goal (united nations, 2015).

<sup>135</sup> The Education 2030 Agenda is set by UNESCO in 2015 for the framework of 2030 by the following targets to achieve: (1) universal primary and secondary education; (2) early childhood development and universal pre-primary education; (3) equal access to technical/vocational and higher education; (4) relevant skills for decent work; (5) gender equality and inclusion; (6) universal youth and adult literacy; (7) education for sustainable development and global citizenship; (8) effective learning environments for all; (9) expand globally the number of scholarship in higher education for developing countries in developed and developing countries; (10) increase the supply of qualified teachers (UNESCO 2017, p. 4-7).

Study and participation in the fine arts have benefits for art trainees and even for non-art trainees, as it is a key component of improving learning throughout all academic areas. It is an effective approach for developing better team players, fostering a love for learning, enhancing art trainee's creativity, and producing a more prepared citizen for the workplace for tomorrow (Khan, & Ali, 2016).

The quality of art education is an important factor to develop critical thinking and creativity to realize art trainee's full potential (Glenn, 2011). High-quality art education can help art trainees to develop a special and distinctive voice about ethics and science in relation to public understanding (Scott, 2008). The need for art education is more than producing an artistic object (Darts, 2006). Emphasizing art education for those who want to create contemporary fine arts and popular arts in contemporary society is essential because they are producing visual culture<sup>136</sup> through their artworks that surround and shape our daily life. This visual culture which is made by visual arts indicates the power of representation, the formation of identities, critical reflection on technological pervasiveness, and the importance of interdisciplinary connections (Freedman, & Stuhr, 2004).

According to Darts art education helps art trainees "to better understand the social power of art and to begin challenging disfranchised notions of the social and political roles of artists in contemporary society" (2006, p. 7). In such a society, artists use different tactics and strategies to confer social and political issues to the audience outside the art world. This could be a provocation, participation, or generating dialogue and debate among the general public in the public sphere. In these public spaces, "artists can be described as *educators* who are teaching the public about the connections between public spaces and private interests" (Desai, & Darts, 2016, p. 189). In fact, art education offers artists to be educators by creating meaningful objects. In this case, art could be considered as a way for artists to challenge issues such as meaning-making, artistic expression, democracy and citizenship, mass media and popular culture, social responsibility, and public education (Darts, 2006). David Darts is an artist and chair of the department of art at New York University. He wrote an article untitled *Art education for a change: Contemporary issues and the visual arts*, discussing the

---

<sup>136</sup> "Visual culture is the totality of humanly designed images and artifacts that shape our existence" (Freedman, Stuhr 2004, 816).

transformative power of art and the connection between art education, meaningful arts, and social changes. In this article, he suggested that art educators could help their students by encouraging them to negotiate the challenges of living in a rapidly transforming and globalizing world, in a way that students concentrate on the production of meaning besides the production of artistic objects. He stated:

Connecting curriculum to the lives of students through art education is a natural fit. Proponents of visual culture approaches to art education explain the production, evaluation, and distribution of cultural artifacts, and social meaning continues to be a visual component of our increasingly visual world today (Darts, 2006, p. 7).

David Darts's statements as an artist, art professional, and art professor indicate a shift in teacher-student transference. This shift started since the 1930s, when *Bauhaus*<sup>137</sup> in Germany combined crafts and fine arts on their teaching programs, promoting better training for craftsmen and a wider practical autonomy for designers, hence they could execute their ideas. Bauhaus had an enormous influence on modern design and arts education in several countries. Angela Carbone and Judy Sheard wrote the article *Developing a Model of Student Learning in a Studio-Based Teaching Environment*, explaining how a studio-based teaching model developed the metacognitive skills of students. In this article, the influence of Bauhaus school is addressed as an inspiration for making changes in studio-based teaching and learning:

The Bauhaus school had three aims: the first was to “rescue all of the arts from the isolation in which each then found itself” (Whitford, 1992) in order to encourage the individual artisans and craftsmen to work cooperatively and combine all of their skills. Secondly, the school set out to elevate the status of crafts and everyday objects such as chairs, lamps, teapots, etc., to the same level

---

<sup>137</sup> Bauhaus was a German art school operational from 1919 to 1933 that combined crafts and the fine arts and was famous for approaching design in a very pragmatic and conceptual way. (Chilvers 2009, 64-66)

enjoyed by fine arts, painting, sculpting, etc. The third aim was to establish contact with the leaders of industry and craft in an attempt to eventually gain independence from government support by selling designs to industry (Carbone, & Sheard, 2002, p. 204).

Bauhaus had an enormous influence on modern design and arts education in several countries. This influence included the radical change in traditional teaching which focused on lecture theatre, tutorial room, and laboratory environments, while offered studio-based teaching and learning model (Carbone, & Sheard, 2002). Artists and designers traditionally provided the projects to be executed by skillful glassblowers. It potentiated a harmonious relationship between artists, designers, and artisans. However, this approach changed with the influence of Bauhaus and the advent in the '60s of the Studio Glass Movement in America and Europe which contested the traditionally passive role of the artist and designer and determined a more *hands-on* approach (Corning Museum of Glass, 2011). The artists and designers became more aware of the necessity of learning the fundamental glass art techniques and thus being able to collaborate with skillful glass masters. This means to articulate a university background with tradition to obtain better and successful results.

Glass art education assumes the craft heritage in education as an opening door for a better dialogue with the artist. Yair, Tomes, & Press in *Design through making: crafts knowledge as a facilitator to collaborative new product development* stated: "Craft education and practice are centered on a dialogue between creativity, materials, skills, and the artist developing ideas by combining conceptual vision with manipulation of the object" (Yair, Tomes, & Press, 1999, p. 498).

There is a long tradition of glass education in universities and high schools in European countries such as England, the Czech Republic, and Nordic countries (Martinsone, 2000) (Langhamer, 2006) and the Netherlands. For instance, the Department of Glass and Architecture in the Academy of Fine Arts and Design in Bratislava was established in 1965 (Balgavá, & Eliëns, 2005), and the Secondary School of Glassmaking in Kamenický Šenov, in the Check Republic, was established in 1856 (Langhamer, 2006). The glass department of *Gerrit Rietveld Academy* in the Netherlands offers glass art education since 1969 (Eliëns, & Prisse, 2009) and *the National School of Glass Orrefors* (Swedish: Riksglasskolan) at the center



of what is known as the Kingdom of Crystal in Småland in Southern Sweden has educated students since 1969.

The literature on contemporary glass art shows that public glass art is strongly influenced by glass education as well as the cultural and historical context of modern and contemporary societies. The education system on one side can prepare artists to know all aspects of glass art and safeguarding techniques, and on the other side can prevent vandalism of public glass art pieces, organizing educational programs and workshops for the general public (Faghihi, Almeida, & Quintas, 2016).

#### **4.3.1 Glass Education in Portugal**

Regarding glass education in Portugal, there are several institutions that offer this training. Superior School of Design in Caldas da Rainha (ESAD), Fine Arts Faculties of Porto (FBAUP) and Lisbon (FBAUL) University, Superior School of Education in Viana do Castelo (ESE-IPVC), and VICARTE with a master in glass and ceramic art and science (FCT- NOVA and FBAUL), have glass workshops where art students can learn how to work with glass and create glass artworks (Frade, personal communication, 7 November, 2017). According to Prof. Teresa Almeida, just one of them, the Superior School of Design in Caldas da Rainha (ESAD) offers an undergraduate degree in *Product design – glass and ceramic*. In FBAUP glass art is taught as a course among BA degrees in Painting/ Sculpture/ Multimedia/ and Design, although students from the Fine Arts Master can choose to do their research in glass. However, their degree will not be in *Fine Arts- Glass* (Almeida, personal communication, 17 April, 2020 a).

The Escola Superior de Design in Caldas da Rainha (ESAD) offers a 3 years' undergraduate course '*Product design – glass and ceramic*'. This is the only specific course for an undergraduate student to focus on ceramic and glass products design and development, for both industry and manufacturing 'Craft' (Figure 4-22). An interview was conducted with Professor Fernando Carradas, in Escola Superior de Artes e Design de Caldas da Rainha, 7th Nov 2017. He is a Professor at the University of Caldas da Rainha in ceramic courses, and he was the coordinator of the *Product Design course in ceramic and glass* for 6 years. He stated that the university of Caldas da Rainha had a course in *design and technology for ceramics*

about 7-8 years ago<sup>138</sup>, then, they decided to develop the design projects for the ceramics and glass industry. The new course (they introduced) educates and prepares the students to develop design projects for the ceramics and glass industry, or in the alternative, to create glass and ceramic artworks in their own studios. He explained the main goal of this course is to educate students for learning the technology of glass and ceramic for gaining experience in the glass and ceramic industry. Carradas added, “students of this course will learn some techniques of glass art such as Fusing and kiln-forming pieces combine with molds in the university and to learn more techniques, the students are sent to Cencal to pass one week and a half, full-time courses on learning and experimenting other glass art techniques” (Carradas, personal communication, 7 November, 2017). According to Alexandra Abreu (she is teaching ceramic and glass art courses in ESAD), due to the limitations in the size of the kiln and the glass workshop space in the Escola Superior de Design in Caldas da Rainha (ESAD), the students usually experiment and create small pieces of glass art. She added that the students experiment with Pate de Vere, partial fusing, full fusing, and slumping (Abreu, personal communication, 7 November, 2017).

An interview was conducted with Professor Teresa Almeida on the 17<sup>th</sup> of April 2020. According to Teresa Almeida<sup>139</sup>, in the Faculty of Fine Arts of Universities of Porto (FBAUP), stained glass unit, dated back to the 1950s, even though in that period they were more theoretical. In Porto, the practical classes only started later when the university bought a kiln from England for the Glass workshop. Teresa Almeida became a lecturer in 2009 and since this period we witness a change in the curriculum. Kiln casting techniques began to be taught and protocols were established with CRISFORM and later CENCAL; so, the students could do glassblowing training (Almeida, 2011). In the glass art workshop of FBAUP, different glass art techniques are available to be learned including: Fusing, casting (both mold casting and wax casting), slumping, engraving, *pâte-de-verre*, painting on glass, screen printing on glass, and

---

<sup>138</sup> Please note that the dates mentioned in this part dated back to the interview the author had with Professor Fernando Carradas in November 2017.

<sup>139</sup> Teresa Almeida is a Portuguese artist working mainly with glass, living in Porto. She got two Post-graduation certificates on “Glass and Architecture” and in “Glass and Fine Art” at Central Saint Martin’s College, London, England. She completed her Master in Glass at the University of Sunderland, England, then, got a PhD in Art Studies at the University of Aveiro. Currently, she is a professor at the Faculty of Fine Art, University of Porto. Since 2006 she is part of the research Unit I&D ‘VICARTE’ and since 2011, she is part of the i2ADS Research Institute in Art, Design and Society, Faculdade de Belas Artes da Universidade do Porto.

stained glass (Figure 4-23) (Figure 4-24). Taking the glass art course unit is not mandatory; students can choose to do it. With the change of the education system in Portugal to Bolonha, the annual class changed to be only one semester, so the students cannot have a deep study. However, we witness an increase in the interest in glass art courses and workshops among students, as well as PhD and Postdoctoral researches (Almeida, personal communication, 17 April, 2020 a).



Figure 4-22. Glass workshop of Escola Superior de Artes e Design de Caldas da Rainha, Portugal. Captured in 7.11.2017. ©Parinaz Faghihi.

There is an interdisciplinary set of projects conducted between glass and printmaking studios. The cooperation between these different areas and technologies started in the context of *Pure Print-International printmaking meeting* ([pureprint.fba.up.pt](http://pureprint.fba.up.pt)). Artists and academics working and conducting research in various universities were invited to participate and four workshops were organized in 2013 in the area of printmaking glass and ceramics (Almeida, 2016). Projects were developed and the outputs were displayed in several

exhibitions. The outcome was the exhibition *Specularis, looking through* held in Alberto Sampaio Museum, Guimarães, Portugal in Summer 2018 (Almeida, 2018 b).



Figure 4-23. Glass workshop of the Faculty of Fine Arts, University of Porto, Portugal. Captured in 19.11.2020. ©Teresa Almeida.



Figure 4-24. Photos of the 'kiln room' that are shared between glass and ceramics workshop. Faculty of Fine Arts, University of Porto, Portugal. Captured in 19.11.2020. ©Teresa Almeida.

Regarding the glass art courses in FBAUL in Lisbon, an interview was conducted with Professor Fernando Quintas<sup>140</sup> who teaches glass and mosaic (and other disciplines) at the Faculty of Fine Arts of the University of Lisbon (FBAUL). In 2001 he went to Corning in USA and learned more about glass art techniques because what he has learned about glass art in FBAUL as an art student was more theoretical and a little about stained glass technique. When he came back from the USA, he continued to work as a Professor in FBAUL, teaching glass students what he has learned in the glass workshops of the USA (and later Italy and Portugal). In the same year, he was invited to be one of the founding members of the VICARTE Research Unit. He was also elected president of APV (Associação Portuguesa do Vidro) from 2006 to 2009. He stated that when he started to teach glass art and mosaic in FBAUL in 2000, there were not enough facilities, tools, and machines (they did not have a kiln, for example), therefore, students just learn how to cut glass and apply techniques that did not need the kiln. For experimenting with fusing and casting, students were taken to glass art workshops/traditional factories around Lisbon to experiment or watch glass blowing techniques. Later, when VICARTE started to function on a regular basis, the glass students of FBAUL were taken to the glass workshops of VICARTE where they could use the kilns and several polishing machines. After 2010, when the FBAUL glass facilities were better equipped, the students could use different glass art techniques more broadly and consistently. In 2010, FBAUL bought the first kiln and later the second kiln which provided better possibilities for glass art techniques, including fusing, casting, slumping, pate de verre, and painting (Figure 4-25). In FBAUL, the traditional stained glass technique is not taught because the number of students is very high and the space of the workshop is quite limited. When possible, the glass students of FBAUL are taken to VICARTE for some specific workshops with selected artists and professors, to learn glass art techniques such as sand casting, frameworking, and blowing (Quintas, personal communication, 3 November, 2020).

---

<sup>140</sup> Fernando Quintas was born in Lisbon in 1966. He has got his bachelor's and master's degrees in painting in FBAUL. In 2001 he went to Corning, USA, to learn more about glass art. He came back to Portugal and later got his PhD in contemporary stained glass (FBAUL) in 2015. He held several collective and individual exhibitions, having received honours and awards in painting and drawing. He is one of the founding members of the VICARTE Research Unit.



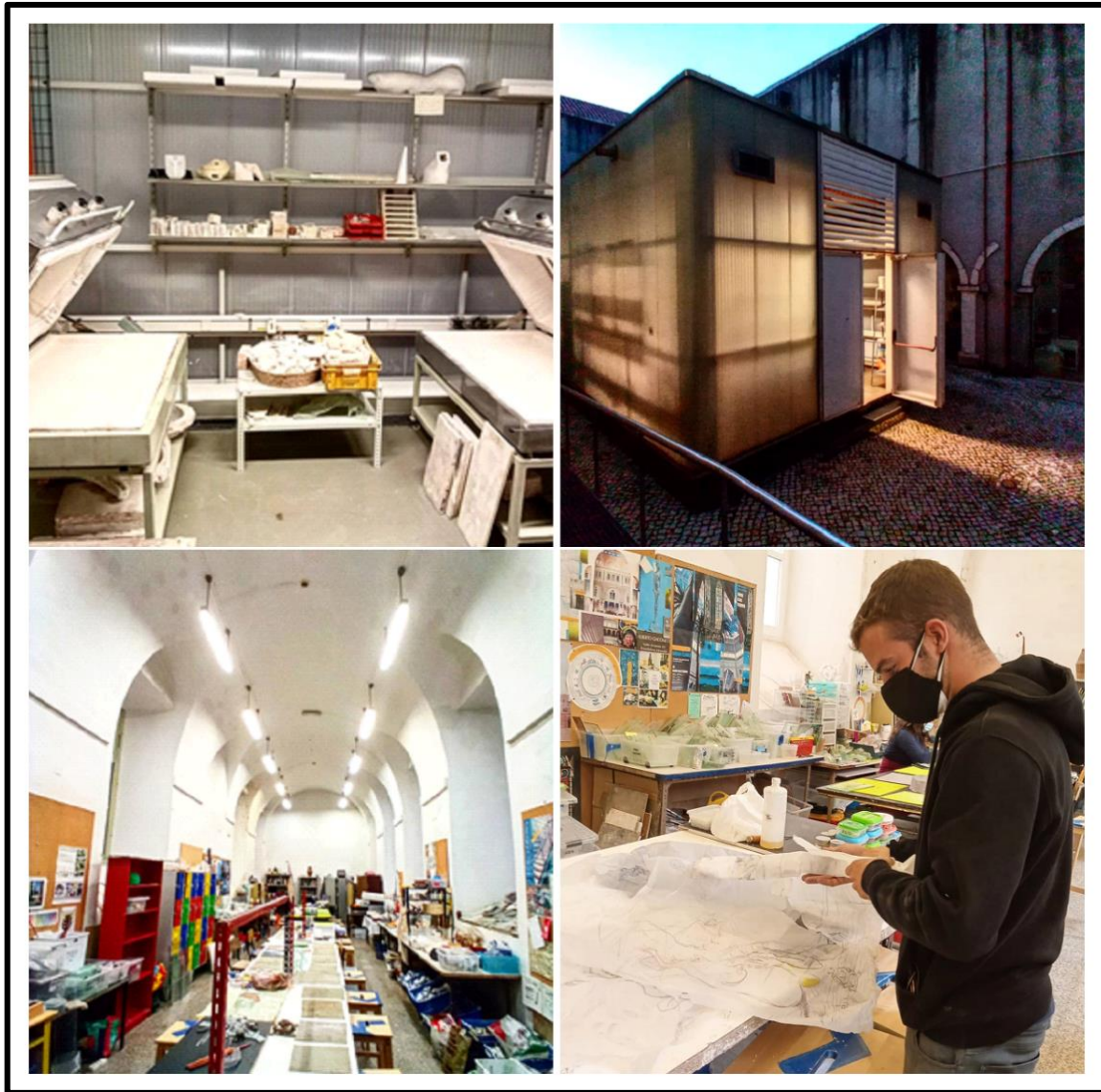


Figure 4-25. Glass workshop of Faculty of Fine Arts of the University of Lisbon (FBAUL), Portugal. Captured in. February 2021. ©Fernando Quintas.

In 2002, VICARTE *'The Glass and Ceramics Research Unit'* research center established a partnership between the Faculty of Science and Technology of NOVA University of Lisbon, and the Faculty of Fine Arts of the University of Lisbon to offer a Master course in 'Glass art and science'. VICARTE gradually collaborates and connects to national and international research groups, individual glass and ceramic artists and investigators, laboratories, institutions, universities, museums (VICARTE, n.d.). In addition, VICARTE is responsible for the supervision of Master and PhD thesis in Conservation and Chemistry involving glass and ceramic at FCT-NOVA, and in Art and Design at FBAUL and FBAUP (VICARTE, n.d.).

Later in the academic year 2018/2019, to the previous Master was added the Ceramic component, and the name was changed to MGCAS - *Master in Glass and Ceramic Art and Science*<sup>141</sup>, continuing the association with FCT-NOVA and FBAUL and the close collaboration of VICARTE Research Unit.

It shouldn't be unmentioned that CENCAL (refer to section 3.2) in Marinha Grande has a very important role in the education of glass art in Portugal. Every year several art students (from ESAD and FBAUP) and non-students (from general people) attend the glass training courses (free of charge only for Portuguese people) in CENCAL to improve glass art skills (Figure 4-26).



Figure 4-26. Lampworking workshop in Cencal. Marinha Grande. Captured in 24.3.2018. ©Parinaz Faghihi.

From the academic year of 2017/18, the Polytechnic Institute of Viana do Castelo in the north of Portugal (ESE-IPVC) offers a course on Fine Arts and artistic technologies (Artes Plásticas e Tecnologias Artísticas) which glass art is taught at 'Laboratory of artistic technologies' (<http://www.ese.ipvc.pt/>). According to Daniela Pinheiro the lecturer of the glass art unit course in this institution, they don't have the technical condition to do and

---

<sup>141</sup> The Master's Degree in Glass and Ceramic Art and Science (MGCVC), is a modification of the previous Master's Degree in Glass Art and Science (MACV).

experiment with hot glass art techniques, and the students can only experiment with the processes of cutting, painting and engraving glass. Pinheiro added, “I also encouraged the students to incorporate other materials in their works, creating a mix of glass and other techniques: like wood, metal, clay, or tissue” (Pinheiro, personal communication, 25 June, 2020).

In Portugal, glass art education is improving, and it is anticipated that there will be more glass artists and, eventually, glass artworks. Knowing glass art techniques assists artists to integrate them with other materials and putting innovative concepts and ideas into action.

#### **4.3.2 Glass Education in Iran**

A brief history of glass art was investigated in chapter 3.4, therefore, it is understandable that glass art has a long history in Iran which passed many ups and downs until now. An interview was conducted on 20<sup>th</sup> November 2020 with Arezoo Khanpour<sup>142</sup> who is a lecturer and assistant professor at Tabriz Islamic Art University. According to Arezoo Khanpour, the glass art education in Iran has been handed down from generation to generation through master-apprentice style for many years. Later the glass art under the handicrafts Bachelor's degree started to emerge in the universities. Currently, academic glass art education in Iran is offered in Art Universities in different cities such as Tehran, Tabriz, Isfahan, Yazd, Mashhad, and some other universities. To learn glass art techniques, students of associate degrees and bachelor's degrees in the field of Handicrafts pass two or four semesters in glass workshops.

In 2006, Tabriz Islamic Arts University offers a Bachelor of '*Islamic Arts-glass art and industry*' with a specific focus on glass art. This university is the only university in Iran that has a furnace for blowing which is turned on once or twice a year for one month (Figure 4-27) (Hosseini, personal communication, 12 September, 2018). According to Arezoo Khanpour

---

<sup>142</sup> Arezoo Khanpour was born in Tehran in 1985. She is a faculty member and assistant professor in glass art practical and theoretical courses at Tabriz Islamic Art University. She has got her bachelor's and master's degrees in the Handicrafts field in 2010. Then she has got her PhD in Art research (the development of contemporary Iranian and Western glass art, based on Anthony Giddens Structuration theory) in 2020 from the Faculty of Art of Alzahra University in Iran.

glassblowing was and (mostly) is a job for only men in Iran<sup>143</sup>, while she went to glassblowing factories in the suburbs of Tehran, learned, and experienced this technique. Today Arezoo Khanpour is the first woman in Iran who is doing glassblowing and creates artworks with this technique (Khanpour, personal communication, 20 November, 2020). With the efforts of Arezoo Khanpour, this technique is now taught at Tabriz Islamic Art University; because the university has a furnace and space for blowing technique, and thus, the possibility of teaching glassblowing was offered at Tabriz Islamic Art University. Arezoo added that in this university blowing, lampworking, kiln-forming techniques (such as fusing, slumping, *pate de verre*), stained glass, engraving, sandblasting, painting, and vitreous enamel (porcelain enamel) on glass are also being taught (Khanpour, personal communication, 20 November, 2020).

Regarding the facilities and studios provided by other art universities (except Tabriz Islamic Art University) in Iran, most techniques are only approached on theory and few are put into practice, which leads to a lack of adequate knowledge to create various glass artworks by artists (Figure 4-28). The lack of connection between art universities and industry has destroyed a bridge between artists and artisans and affected the influence of glass artworks on Iranian cities and society.

An interview was conducted with Hayas Hosseini (Hosseini, personal communication, 12 September, 2018) one of the noted glass artists in the lampworking technique in Iran. He was asking about the quality and quantity of glass art education in Iran universities. He described there are 30 to 32 universities and colleges in Iran that offer glass art as credits of bachelor of Handicrafts. In these glass art courses, only some techniques are taught such as fusing, painting on glass, engraving, and Stained glass. Hayas said, glass education in Iran is more likely to be deprived, as in art universities, students cannot experiment with many of the glass art techniques available for contemporary glass artists. Therefore, their creative ideas are limited to the use of a few techniques.

---

<sup>143</sup> Also in Portugal, glass blowing is a job for men, and currently, in Portugal, only one woman (Rita Barata) working as a glassblower.





Figure 4-27. Glassblowing workshop in Tabriz Islamic Art University. Tabriz, Iran. Captured in 23.11.2020. ©Arezoo Khanpour.





Figure 4-28. Glass workshop of the Art University of Tehran, Iran. Captured in 1.2.2016. ©Parinaz Faghihi.

In recent years, Hayas Hosseini and some other glass artists with the collaboration of *Abgineh* (the Glassware and Ceramic Museum of Iran in Tehran) tried to organize contemporary Iranian glass art exhibitions with workshops and lectures. These efforts are helpful and generate enthusiasm for the new generation of glass artists and art trainees.

*Abgineh* Museum has great potential in providing glass art education for art trainees. This museum has allocated space for training students in recent years, hence, it is possible to teach various fields of art related to the Museum's interests and objectives. Moreover, there is a professional library in the museum, including 4,000 books in the field of Archaeology and Art History, and glass art and science. But the authority and manager of *Abgineh* Museum do not use its capacities.

In January 2016, another interview was conducted with Hayas Hosseini (Hosseini, personal communication, 7 January, 2016). He talked about the Atomic Energy Organization of Iran that established a Vocational school (Payame Shahid technical and vocational school with the support of Educational Industry Company) in Tehran in 1991. The school aimed to train students for making laboratory glassware for scientific experiments and other works in science, especially in chemistry and biology laboratories. This school lasted just for ten years until 2001, and, after training about 100 students, closed due to some economic problems. Hayas stated that the Vocational School was established to mainly provide chemical and scientific glass studies. He also stated that out of 100 students, only eight are now working in the field of glassware and one (Hayas Hosseini) is working as a glass artist. Moreover, he argued that although the aim of the school was not only for training artists, at least it opened a window for students to know and work with glassware (Hosseini, personal communication, 7 January, 2016).

I think glass art education is in process of improvement in Iran; especially because of the facilities and quality of education that is provided at Tabriz Islamic Art University. Therefore, it can be estimated that the state of glass art will be enriched by the newly graduated students from this university.

#### **4.3.3 Glass Education in Great Britain**

The brief history of glassmaking in Great Britain is provided in the chapter (3.6). The literature review on the history and current state of glass art in Great Britain proved the important role of glass art training and education in the way to developing public glass art. Providing intensive art education and glass art training in art

programs/schools/academies/universities, as stated, has a major effect on enhancing the benefits of glass art. Glass education in Great Britain is offered as non-degree(ND) and with degree(D) courses which are mentioned below:

1. (D) De Montfort University, School of Art & Design, Leicester. (BA (Hons) Design Crafts, a multidisciplinary course with glass and hot glass options).
2. (D) Royal College of Art, London. (MA Ceramics and Glass).
3. (D) University of Sunderland, Sunderland. (BA (Hons) Artist Designer Maker – Glass and Ceramics (3 years full-time and part-time also available), MA Glass and Ceramics (1 year full-time or 2 years part-time), MPhil, PhD).
4. (D) University of Wales Trinity Saint David, Swansea College of Art, Swansea. (BA Glass – Architectural Arts or Contemporary Practice (3 years full-time or 6 years part-time), MDesGlas – Architectural Arts (4 years FT/8 years PT), MA Glass (3 Semesters), MPhil and PhD, also short workshops & masterclasses).
5. (D) Manchester Metropolitan University. (BA (Hons) Product Design and Craft, MA or MFA Design: Craft (MA 1 year full-time, 2 years part-time. MFA 2 years full-time or 4 years part-time) – a multidisciplinary course for makers looking to explore craft practices across a range of materials including glass).
6. (D) Plymouth College of Art, Plymouth, Devon. (BA (Hons) Ceramics & Glass, MA Glass).
7. (D) University of York, York. (MA Stained Glass Conservation and Heritage Management (2 years full-time)).
8. (D) The University College for the Creative Arts, Farnham. (BA (Hons) Glass, Ceramics, Metalwork, Jewelry (3 years full-time) and MA Glass (1 year full-time or 2 years part-time)).
9. (D) University of Hertfordshire. (BA (Hons) Design Crafts – Ceramics and Glass (3 years full-time, 4 years' sandwich, or 6 years part-time)).
10. (D) Nottingham Trent University. (BA (Hons) Decorative Arts (3 years full-time) – A multidisciplinary course across a range of materials including glass).
11. (D) Edinburgh College of Art, Edinburgh. (MA Glass (1 year full-time) or MFA Glass (21 months full-time)).

12. (D+ND) Glasgow College, Glasgow, Scotland. (HNC Art and Design – Art Glass (1 year full-time). Glasgow College, City Campus has short courses in decorative glasswork and hot glass).
13. (D+ND) University of Wolverhampton, Wolver Hampton, West Midlands. (BA (Hons) Glass and Ceramics (3 years full-time, 4 years sandwich 5-6 years part-time) (MA Design and Applied Arts) .
14. (ND) West Dean College, West Sussex. (Offers glass art short courses).
15. (ND) City of Westminster College, London.
16. (ND) Contemporary Glass Society, Kingswinford, West Midlands.
17. (ND) Dudley College International Glass Centre, Brierley Hill, West Midlands. (Art & Design BTEC Diploma – A multidisciplinary course including glass working).
18. (ND) Liquid Glass Centre, Trowbridge, Wiltshire.
19. (ND) London Glassblowing Workshop, London.
20. (ND) Morley College, London. (Offers Stained glass course).
21. (ND) National Glass Centre, Sunderland. (Offers glass art short courses).
22. (ND) Kensington and Chelsea College. (UAL Level 2 Diploma Art and Design – ceramics, glass and jewelry, BTEC Certificate in Art & Design Level 3).
23. (ND) Pearsons Glass. Liverpool. (Offers short glass courses).
24. (ND) Northlands Creative Glass in Lybster has masterclasses in various glass techniques.

According to the British Society of Master Glass Painters, besides the aforementioned places that offering glass art education and glass art training courses, numerous studios across England are providing courses and workshops (British Society of Master Glass Painters, n.d.).

One of the factors that caused this variety of places to offer glass art education in Great Britain is the economic development that supported glass crafts and glass art education (it is discussed in the next section 4.4).

Different universities and institutions have different facilities and attitudes toward teaching glass art. To better understanding these differences, an interview was conducted with Dr. Vanessa Cutler was studied glass art in Wolverhampton, and Sunderland University, and later was a MA Glass Programme Director and Senior Lecturer in Swansea School of Glass,

University of Wales Trinity St David. She is currently a senior lecturer and led a Product Design course at Chichester University. About the glass art education at Swansea University (Figure 4-29), she stated:

When I arrived (to be as a lecturer) (it) was very much focused on stained glass with some small open casting, but they still had acid facilities, glass painting, and glass history. A very skills-based course that showed techniques. Live commissions and projects in each year group and the annual Steven's competition, run by the Glaziers. Since leaving I think it is now a design crafts course that is more multidisciplinary that offers various pathways glass being one (Cutler, personal communication, 17 June, 2020).

In addition to what is explained by Vanessa Cutler, according to the webpage of Swansea College of Art, the glass department provided facilities including:

Glass kilns for fusing, slumping, casting, enameling, and painting; Acid bay - hydrofluoric acid for polishing and etching; Plaster room for mold-making and prototyping; Wax working; Gelflex/rubber molding facilities; Screen-printing facilities - dedicated workshop for screen-printing on the glass; Sand-blasting - two dedicated sandblasters for glass (one pot-blaster); cold-working facilities - a range of cold-working facilities; including lathes, linishers/edge finishers, hand-grinders, diamond flat-bed grinders, hand engravers, diamond saws, and glass drills; Glass cutting room; Leading room; Glass painting room; Glass studios (Swansea College of Art, n.d).

About the University of Wolverhampton, Cutler stated: "When I was training, there were two floors just purely stained glass and architectural glass. Now, it is two rooms and a shared studio downstairs with rooms that anybody can use and access" (Cutler, personal communication, 25 June, 2020). She added that the focus at the University of Wolverhampton which is run by Dr. Max Stewart is more on architectural glass and industrial glass design. There, hot glass, kiln work, and pate de verre are more taught (Cutler, personal communication, 25 June, 2020).



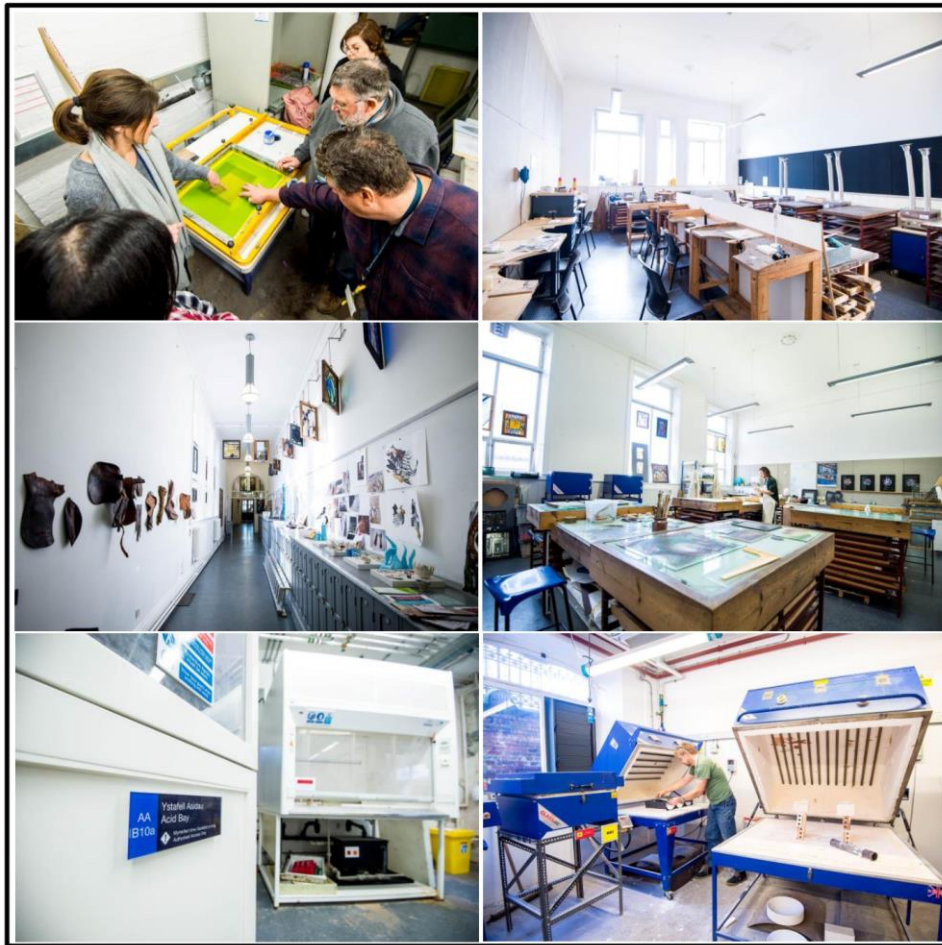


Figure 4-29. Facilities in the glass art department of Swansea College of Art. Swansea, England.  
©2020 University of Wales Trinity Saint David.

An interview was conducted on 23<sup>rd</sup> of June 2020 with Dr. Jessamy Kelly<sup>144</sup> who studied at the University of Sunderland and Edinburgh College of Art and currently is a lecturer in Glass, a practicing glass artist, and also the Program Director of Glass in the University of Edinburgh, UK. About the glass workshop of the Edinburgh College of Art<sup>145</sup>, she stated that she has been taught glass art at Edinburgh College of Art since 2009. She said that the glass workshop is well-equipped for the blowing, cutting, and casting of glass objects. The workshop has space for hot and cold glass-art-making and a plaster room. Lost-wax casting, lost-organic casting,

<sup>144</sup> Dr. Jessamy Kelly (Born 1978) studied Glass and Ceramics at the University of Sunderland and got her Masters in Glass at Edinburgh College of Art in 2002. She completed her practice-based PhD at the University of Sunderland in 2009.

<sup>145</sup> "Helen Monro Turner opened the glass engraving department at Edinburgh College of Art on the 8th January 1941" (Andrews, 2010).

lost-PLA casting, *pâte-de-verre*, fusing, mold making (and advanced mold making), slumping, cold casting, and advanced casting are taught. But because of the space and policy of the glass art education in this university, they stopped doing stained glass technique since 2014. Kelly states that maybe they start teaching this technique again in the near future (Kelly, personal communication, 23 June, 2020).

According to Dr. Cate Watkinson, at Sunderland University, four different streams are available (Figure 4-30). Architectural glass, hot glass, kiln form glass, and ceramics. At glass workshops of Sunderland University, screen printing, painting on glass, *pâte-de-verre*, using water-jet cut glass, fusing to make architectural panels, digital casting such as lost-PLA casting, a different type of castings (wax and organic casting), a lot of kiln formings with mold making are taught. Both Cate Watkinson and Kevin Petrie<sup>146</sup> said that Kiln forming (from flat kiln forming through to 3d large-scale casting) and hot glass techniques are taught as well (Watkinson, personal communication, 9 July, 2020) (Petrie, personal communication, 20 July, 2020). In Sunderland University, the techniques that are taught are very much influenced by the specialty of those who are teaching (Cutler, personal communication, 17 June, 2020) (Watkinson, Personal communication, 9 July, 2020) (Sarmiento, personal communication, 22 June, 2020). For example, during the time that Dr. Kevin Petrie started as a lecturer, the combination of printing techniques and glass art has been taught; and when Dr. Vanessa Cutler started to work as a lecturer the water jet technique in glass has been emerged and taught.

All of the glass training courses and education degrees in glass provide connections with professionals in the field, prepare opportunities such as external competitions and exhibitions. Also, they support and encourage students to develop their creative projects and critical understanding with regards to glass features, by improving their technical and academic skills in research and communication. Petrie stated: "A growing trend in this sector is the development of research degrees (Master of Philosophy and Doctor of Philosophy),

---

<sup>146</sup> Kevin Petrie (Born 1970) is a practicing artist, author, and Professor of Glass and Ceramics at The National Glass Centre, University of Sunderland. He started as a lecturer in 2000 and became a professor in 2008 (Petrie, personal communication, 20 July, 2020).

which allow a focused investigation of technical or conceptual aspects of creative practice”  
(Petrie, 2011, p. 1).



Figure 4-30. Glass and Ceramic department of Sunderland University. ©University of Sunderland.

#### 4.4 Discussion on The Improvement of Glass Art in Public Spaces in Portugal, Iran, and Great Britain

The arts cannot be learned through occasional or random exposure, but rather it requires distinctive educational programs like math or other science (Bryant, 2016). Art education is an essential part of the academic programs and an important component in the educational program of every student. There are two approaches towards the importance of academic art education; first, the importance of academic art education for *all of the students* in the whole academic education system (from childhood to adolescents) which lead to developing an individual's personality and improving learning throughout all academic areas; second, the importance of academic art education for *art trainees and art students* which provides an opportunity for them to know the history of arts as well as recent innovation and creation of artworks. With this knowledge, when the art trainees and art students become an artist, they can think and create an artwork in a forward direction, especially when they want to create public art for contemporary society. This proved that art education is important in the improvement of glass art. Meanwhile, a lack of economic support is an obstacle in the development of glass art education, and economic development could provide an evolution in a demand for public art commissions and thus promote public glass art. Economic development is also influenced by the policy of a government, so, first policy and then the economy is determinative in the improvement of an education system.

According to Cate Watkinson, the universities in the UK do not allocate a huge amount of money for glass art education, because the universities evaluated the courses based on the employability of their graduates. The average wage that a graduated glass artist might earn is small. Moreover, not all the glass art graduated students could work as a glass artist and earn fair money. Also, the expenses of a glass department are expensive due to the cost of the furnace (that should be on the whole year), material, and energy, while the university does not make enough money from student fees (Watkinson, Personal communication, 9 July, 2020).

Therefore, although a high quality of glass art education could be effective in the improvement of glass art in public spaces, the glass art education itself is influenced by the

economic support of the government or any other supporters. To reinforce this statement, Cate Watkinson exemplified the reason for glass art education improvement at Sunderland University and stated:

The economy in Sunderland was supported very much by shipbuilding and coal mining which then finished. They (inhabitation of Sunderland) also had an old industry of glass making, so the government decided to put money into supporting the National Glass Center in Sunderland which also has the glass department from the University of Sunderland and together that support has kept education and glass really quite high on the agenda in the northeast of England. Other departments in Edinburgh and Scotland in Swansea and Wales are finding it quite difficult. We are in a much more fortunate position because we have the National Glass Center, we're still getting support from both the city and from the university. This may change because of COVID-19, because of education and money being diverted into other things. but at the moment we're still being supported (Watkinson, personal communication, 9 July, 2020).

In Great Britain, a suitable platform has been provided for the improvement of glass art in public spaces. This includes providing high-quality art education and glass art education in numerous universities, schools, studios, and workshops. Besides it, the *Percent for Art* policy and the money that came from the European funding helped to not only regenerate and redevelop the buildings but also increasing supply and demand for public art projects. As a reason, when more artists have the skill and knowledge to create glass artworks, there's a greater possibility of including glass art in public art projects. For instance, because of financial supports in the northeast of England, the numbers of public glass art pieces are more than in other parts of England (Watkinson, personal communication, 9 July, 2020). Dr. Cate Watkinson believes that due to the effects of Brexit (the withdrawal of the United Kingdom from the European Union), the public art commissions and the funding of glass art education may not remain as it was (Watkinson, personal communication, 9 July, 2020). As Vanessa Cutler stated: "Often the arts budget is the first slashed when saving money" (Cutler, personal communication, 17 June, 2020). This may happen when the source of money came from the



European Union is cut, the government decrease supporting the city regeneration programs, public art commissions, and art education system. However, it is very much dependent on how the government shapes the policy and manages economic reforms.

Portugal has a great tradition concerning the glass blowing industry and stained glass production (Mendes, 2002). Nonetheless, glass education is only starting to emerge in Portugal as we witness the increase of professional courses and university degrees (Almeida, 2011). In recent years, Portugal has witnessed constant efforts in the development of glass research and training centers for educating glass artists. These efforts have provided glass artists to become familiar with new technologies and execute creative ideas in glass art. With the investment in glass art education, we expect training new glass artists and executing more public glass art soon. Fernando Quintas (2020) believes that the new generation (young people) in Portugal are more cultivated and more associated with art. They go to art galleries, museums, theaters more often than people used to go thirty years ago. He said the spectrum of people are interested in different aspects of arts today, so they are prepared to like art and protect public arts in public domains. Quintas stated that all of these positive changes are because of education (Quintas, personal communication, 3 November, 2020). This proves how much art education is important.

In Iran, glass education is more likely to be deprived, as in most art universities, students cannot experiment with many of the glass art techniques available for contemporary glass artists. Therefore, their creative ideas are limited to the use of new techniques such as painting, fusing, stained glass, lampworking, and engraving on glass. According to Arezoo Khanpour, until the glass art education in Iran art universities is not considered important, glass art will remain in the traditional state. She explained that the young generation of students is not interested to go to glass factories to learn glassblowing (because the factories are far from city centers, have a tough space, and glassblowing required a lot of efforts to be learned) and at the same time the glass factories are not interested to accept them in their space (because educating students distorts their main job, which is to make orders) (Khanpour, personal communication, 20 November, 2020). Therefore, it is important to provide glass art education with good quality in equipped workshops at art universities. And more importantly, provide skillful and qualified professors and lecturers to educate students.

This is not only about providing an educational context to improve glass art and public art, but also providing the basic premises of cultural context and political context.

## Chapter 5: Public Glass Art Project

### 5.1 Introduction

Glass art has not appropriately been involved in contemporary public art in Portugal, even though glass, as a material for art, has a huge potential in terms of production. Portugal has a long tradition in stained glass and glassblowing as it was demonstrated in the previous chapters - especially glass blowing in Marinha Grande -, and, as it was noticed, public glass art has not been widespread throughout the country yet. Such factors urged me to develop an idea for designing a public glass art project to be installed in the central and important public space in the Portuguese city of Marinha Grande, called '*Discovery Sails*'. Safety issues and aesthetic concepts have been taken into consideration in the ideation of this project.

### 5.2 Overview of *Discovery Sails* Project (Presentation of the Fundamental Concepts and Ideas of the Project)

Executing public art is similar to building a bridge between the inhabitants of a city and their identity, culture, and art in the city. To build a strong bridge, an artist should study the background of the city, their culture, religion, their most important concerns, interests, and engagements. The main concerns that are studied for the *Discovery Sails* project are the background of inhabitants' professional careers, population density, history of the city, and the famous people in the history of the region (e.g. Afonso Lopes Vieira).

As an artist and a foreigner, I expect to see public art demonstrating the city culture and art. I think having public glass art as a landmark is vital for Marinha Grande as a reminder of the history and principal industry (Glass) of the city, as well as for the development of the economy and culture of the city. Therefore, I developed and designed the *Discovery Sails* project to install in Marinha Grande which aims to reflect the history of Portugal in its golden period, when great seafarers explored the world with their sailing ships.

By the golden ages, we mean *the golden centuries of discoveries* during the 15th and 16th centuries (Sieber, 2001). Between the 20th and 21st centuries, these years (1415–1543) are mentioned as a landmark of Portuguese culture, when they explored many lands through Oceans<sup>147</sup> (Figure 5-3). David Birmingham (2003) in his book, *A Concise History of Portugal*, states that the golden age of modern Portugal begins in the 18<sup>th</sup> century. In the early eightieth century, King Pedro II (1648-1706) witnesses the first ten years of Brazilian mining prosperity, but the great flourishing trade of Portuguese art and culture was inherited by João V (1689-1750). David Birmingham argued that in the late 1690s, the Portuguese discovered the Brazilian gold as the most crucial element of wealth and privilege of Portugal, and in 1705, the Portuguese empire was the world's greatest gold-producing enterprise (Birmingham, 2018).

In the 15<sup>th</sup> and 16<sup>th</sup> centuries, Portugal was reinvigorated by dynamic thinkers which started long before, in Dom João I kingdom. On 25 July 1415, a Portuguese fleet consisting of King João I (John I) (1357-1433) and his sons Prince Duarte, Prince Henry (The Navigator), Prince Afonso, and Supreme Constable Nuno Álvares Pereira, begins to capture North Africa territories (Correiro, 2006). Finally, on 21<sup>st</sup> August the coastal cities of Ceuta and Tangier were conquered by the Portuguese. In 1488, the Portuguese fleet was able to enter and explore the Indian Ocean routes. In 1498, Vasco da Gama arrived in Calicut and started a maritime route from Portugal to India. After that, the Portuguese explorations went forward to Southeast Asia, such as Japan in 1542 (Correiro, 2006). The complete route of discoveries is shown in Figure 5-3.

In 1500, the Portuguese nobleman Pedro Álvares Cabral became the first European to discover the territories that were later called Brazil (Page, & Sonnenburg, 2003). However, even before the explorations, Portuguese civilization and culture were always connected with the ocean (Nobre, & Magalhaes, 2010). The Atlantic Ocean is the largest Portuguese “border” while at the same time unites Portugal with other continents and rivals. The country's location on the Atlantic allowed the Portuguese to cross the oceans more easily and interact with other countries. Therefore, the Portuguese sailors with *Caravels* explored new lands and expanded the western culture to other lands (Figure 5-1). The caravel was a sailing ship built

---

<sup>147</sup> <https://portugal.com/portugal/information/history/discoveries-golden-age>

by the Portuguese (Figure 5-2) in the 15<sup>th</sup> century to navigate the Atlantic Ocean and the West African coast (Sleeswyk, 1998).

The glass artwork in this project is composed of four glass panels standing next to each other and resembles the shapes of sail ships. These panels show an image of the world map as a reminder of the connection between Portugal and other continents through the oceans. Each glass panel is designed with luminescent frits to absorb the light during the day and glow in the dark at night. The panels are finally protected with laminated glass and installed in cement basements. More detail about the technical part is available in section 5.4.



Figure 5-1. The illustration of the Portuguese Armada fleet in 1507. Taken from the book *Livro de Lisuarte de Abreu*. ©Captain DaCosta.



Figure 5-2. A Portuguese caravel. © Câmara Municipal de Sines.



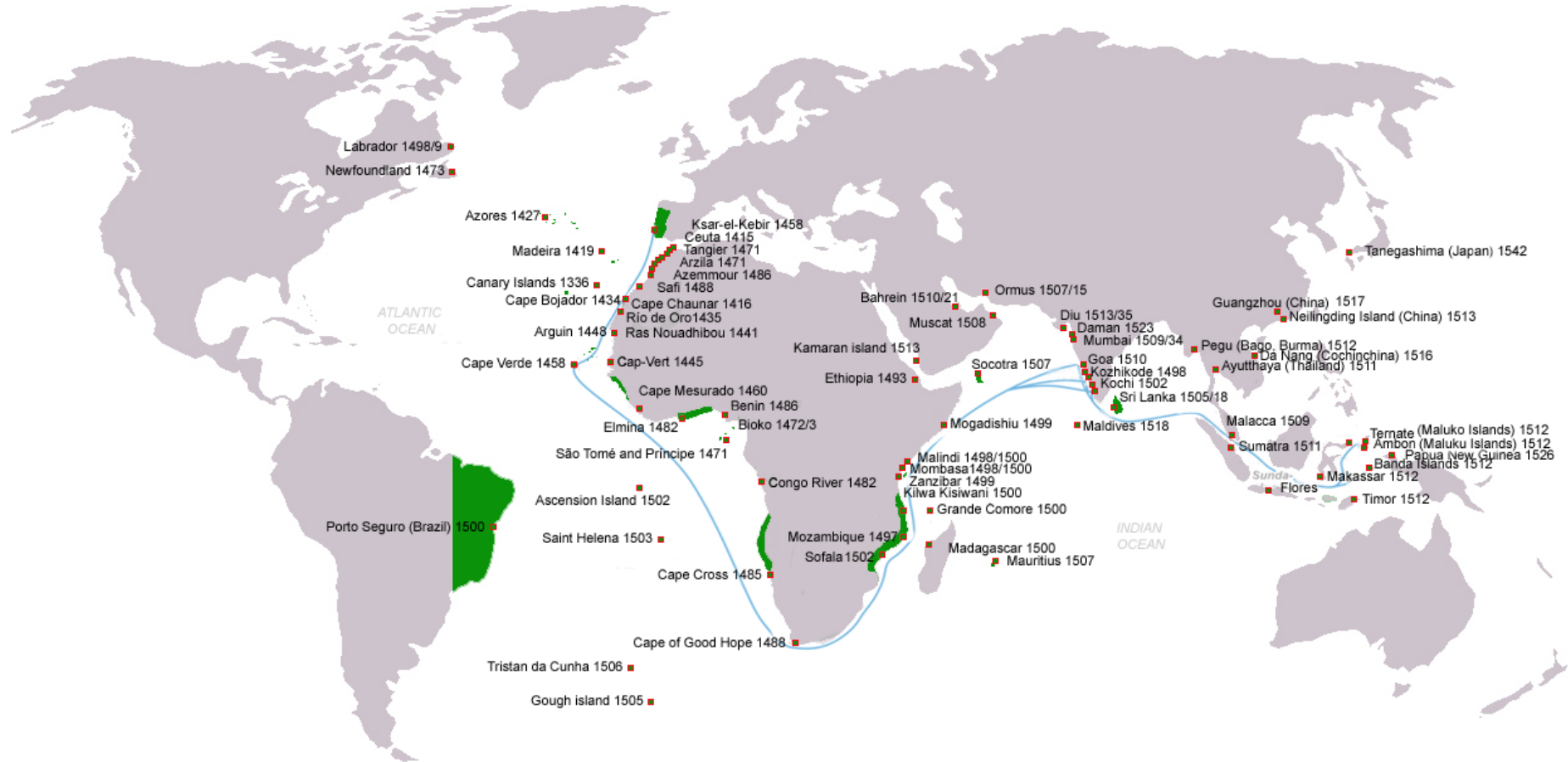


Figure 5-3. Portuguese discoveries and explorations: first arrival places and dates; main Portuguese spice trade routes in the Indian Ocean (blue); territories claimed during King John III rule (c. 1536) (green) © <https://www.livingmsia.com/lisbon-portugal-city-tolerance>.

### 5.3 Objectives of The *Discovery Sails* Project

The motivation behind the *Discovery Sails* project arises from the lack of public glass art presence in Portugal, and the potential that glass art has to represent the world and the identity of the Portuguese culture and civilization. In this project, glass art is employed to create artwork with unique features in a public space in the city center of Marinha Grande, by considering aesthetic and safety issues that demonstrate the personal reflection about the cultural history of Portugal and specifically the city of Marinha Grande. Installing this public glass art creates a place that builds links and connections. It forges bonds between people's emotions and identity, artwork and culture, memories and spirit of the city. Taking into account the current state of public glass art in Portugal and the gaps in this field, the objectives of this project are summarized below:

- Presenting the history, culture, and art of the region.
- Attracting tourism, companies, and investment.
- Enhancing civic identity and the urban residential environment.
- Using the luminescent frits and luminescent stones for the first time in a public glass art project in Portugal as an environmentally friendly material.
- A collaboration between the artist, the research center VICARTE, the Nemoto & Co. Ltd, the Professional Training Center for the Glass and Ceramic Industry - CENCAL, and AGT™ (Ambient Glow Technology).
- Reflecting the personal artistic interests and impressions about the history and culture of Portugal.
- Creating an active dialog between people, facing them with the great history of Portugal and specifically their main important concerns of the city. Special attention will be given to lecturing teenagers and secondary school students about this project, because they are the future inhabitants of the city and keepers of the sculpture, by protecting it if advised to do so.

## 5.4 Important Elements to Contextualize the Project

### 5.4.1 Work Location

Marinha Grande is a city located in the middle of Portugal in the Leiria District (Figure 5-4 and Figure 5-5) near the coast and magnificent beaches such as Praia da Vieira, Nazaré, and São Pedro de Moel. This city is famous in Portugal as *the land of glass* or *The Glass City*, as it is Portugal's biggest glass manufacturer and owning the concentration of many glass factories in this area (Almeida, 2020 b).



Figure 5-4. This map shows the Leiria District in the middle of Portugal.

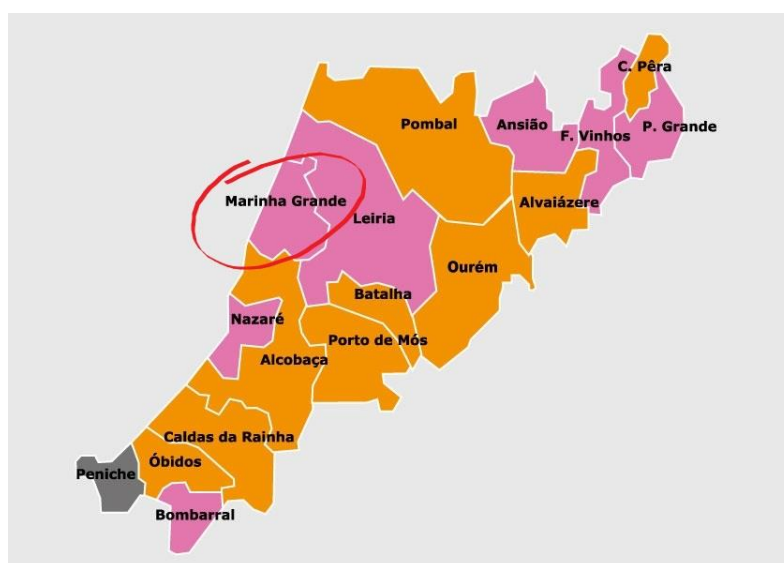


Figure 5-5. This map shows Marinha Grande among the other cities of the Leiria District. ©Região de Leiria.

While analyzing Marinha grande's most-used urban space and tourist areas (Figure 5-6), I thought of a site that could be appropriate for installing a landmark in the most-visited location across the city's circulation areas and the meeting place for gatherings and events. Besides that, I spoke with Catarina de Sousa Carvalho<sup>148</sup> (who was responsible for the culture department in 2017), Tânia Rosa Martins (she is responsible for the Glass Museum of Marinha

---

<sup>148</sup> Catarina de Sousa Carvalho was a superior technician/museum conservative at the municipality of Marinha Grande, acting as a coordination and management functions at Afonso Lopes Vieira house Museum and Glass Museum.

Grande since 2015), and Cidália Ferreira (who was the mayor of Marinha Grande at that time) in the opening of Bordalo Pinheiro exhibition in Marinha Grande, November 2016. These conversations were about the possibility of the project execution and the city of Marinha Grande having a clear view of the region's public art sculptures potential. They saw the first sketches of the project and liked the idea and verbally agreed to support the project.



Figure 5-6. These photos are taken from Marinha Grande Glass Museum and the surroundings.  
©Parinaz Faghihi. May 10th, 2017. ©Parinaz Faghihi.

Eventually, I noticed two sites that seemed appropriate for the installation of this public glass art project. First, I selected site number 1 in the center of Marinha Grande in front of the Glass Museum, near Cultural Center (Casa da Cultura), and Professional and Artistic School (Escola Profissional e Artística). The proposed location provides comfortable viewing for people passing the street either on foot or by car. (Figure 5-7, Figure 5-8). It can also be a helpful symbol to indicate the location of the Marinha Grande Glass Museum to tourists and visitors.

The second place, site number 2, is in the yard of the Marinha Grande Glass Museum (Figure 5-9, Figure 5-10). Site number 2 is accessible not only to inhabitants of the city but also to everyone and it is more secure while the building closes its doors to the public after midnight and has a security guard. Therefore, the risk of vandalism is reduced. Both sites that are suggested show a tight connection between the artwork, the Glass Museum, and the city (Figure 5-11).

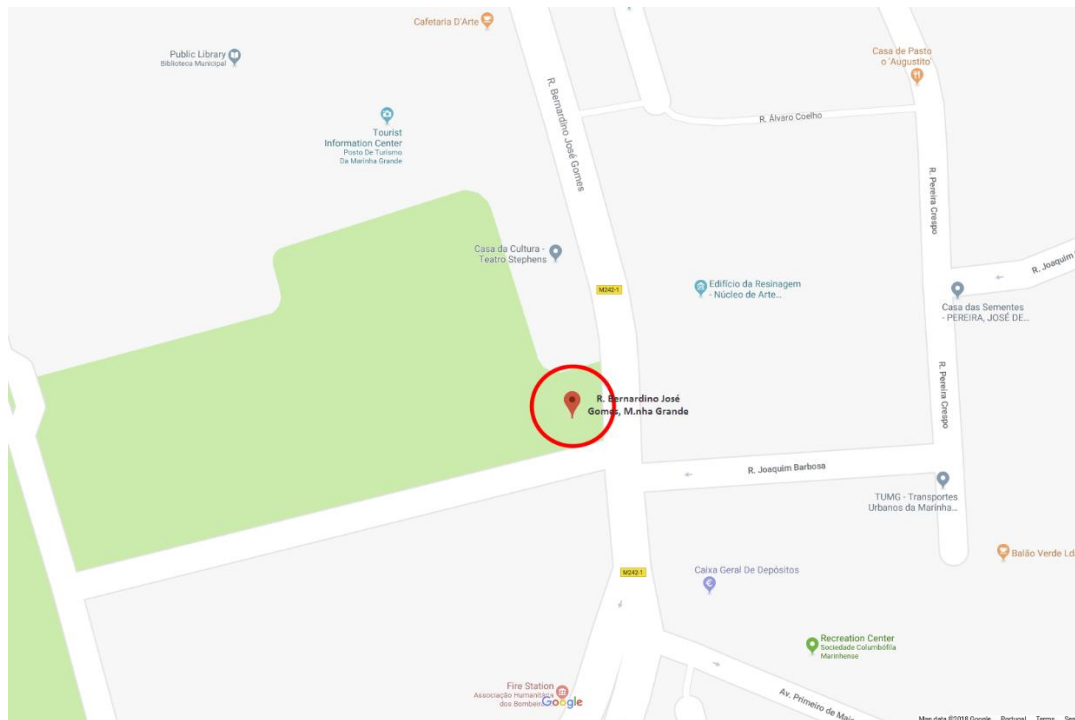


Figure 5-7. Site number 1 selected for the installation of public glass art on Google map.





Figure 5-8. Site number 1 selected for the installation of public glass art.  
©Parinaz Faghihi.



Figure 5-9. Site number 2 selected for the installation of public glass art. ©Parinaz Faghihi.

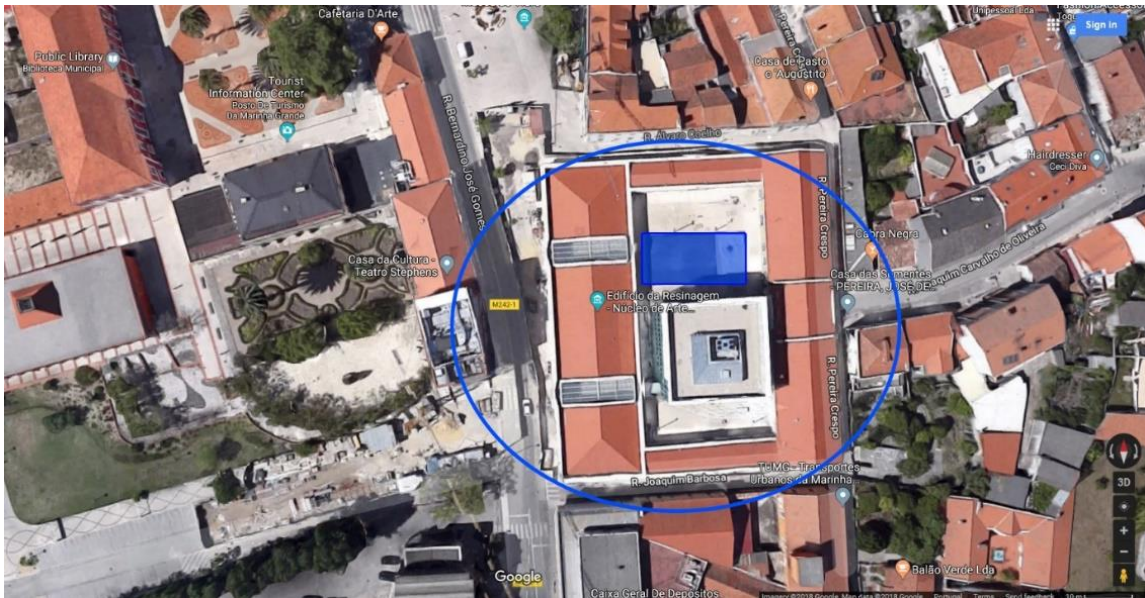


Figure 5-10. Site number 2 selected for the installation of public glass art on bird's-eye view. This photo is a screenshot from the Google map.

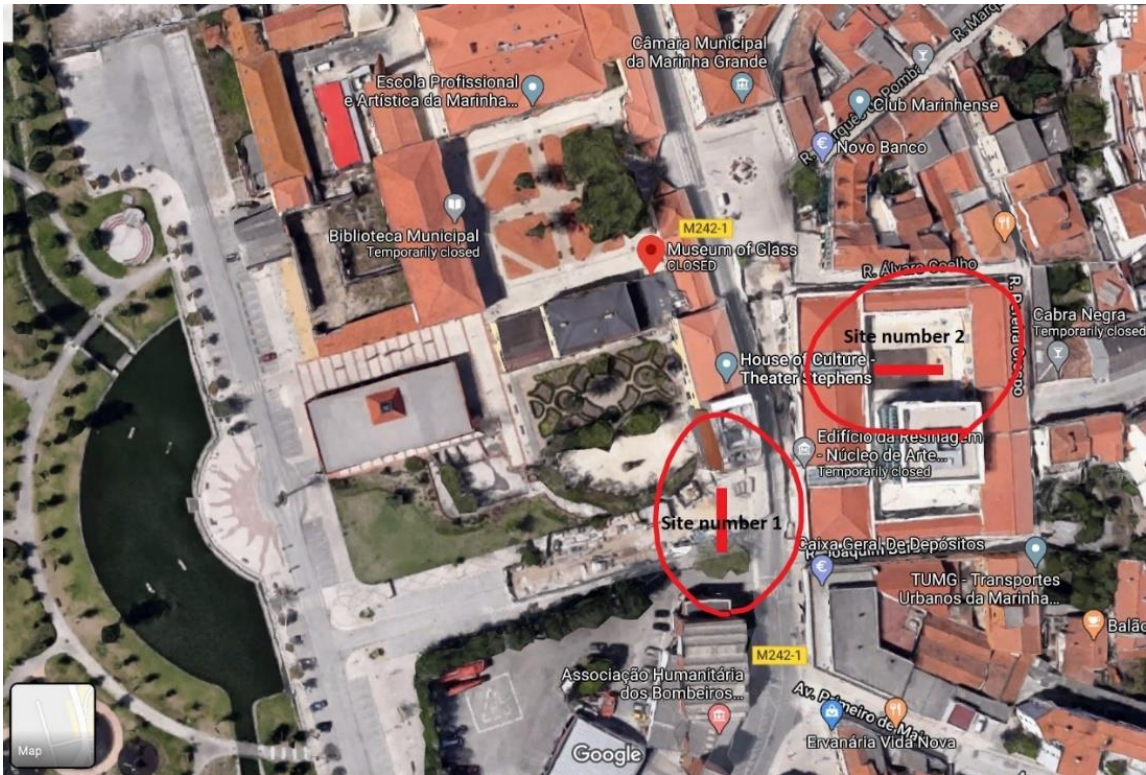


Figure 5-11. A bird's-eye view of Marinha grande city center, Glass Museum, and surrounding buildings. The suggested places (site numbers 1 and 2) for the installation of public glass art are marked in red.

#### 5.4.2 Characterization of Social Targets and Publics Which May Benefit From Its Construction

It is estimated that most of the city inhabitants, students, and tourists face this public art while circulating around the city. Moreover, the proposed project is beneficial to all generations of city residents, glass artists, and glass art trainees.

- Inhabitants of the city:** Various generations of Marinha Grande residents are associated with glass factories and glass art. This artwork would allow the new generation of inhabitants (children, teens, and youth) to be more conscious of the Marinha Grande history and it will serve as a source of glass art/crafts memories for those who formerly worked in glass factories and are retired. Thus, glass art is preserved in their minds. When they pass near this public glass art, they are reminded about the Portuguese 'golden ages' and glass art as one of the most important

elements of their local culture. This kind of monumental public art may raise questions in the audience's mind such as who the old generations were (sailors who explored the world in the 15th and 16th centuries) and who are the new generations today? What is the role of new generations in promoting and developing the country nowadays? Is there a need for creating a golden age once again? What should be done to continue the path of progress and success? These questions can help to promote the community's intellectual level.

- If the *Discovery Sails* project is going to be installed in site number 1, the public glass art can be seen by residents who might pass on foot or by car every day on their way to work or to have a walk along the Cerca Park.
- If the project is installed in site number 2, the public glass art can be seen by everyone; especially by those who are coming to visit the glass museum, coming for an event in the Amphitheater, or coming to do their official works in the municipality.
- **Teenage students:** Students of Professional and Artistic School (Escola Profissional e Artística) of Marinha Grande may pass the street nearby on the way to school (if the project installs in site number 1). This project will impress the students because the artwork uses a material (glass and luminescent stones) rarely seen in public art in Portugal and also reminds the history of the city and Portugal for teens. Teenagers' identity usually shapes by the surrounding atmosphere. Therefore, it is crucial to create an environment that engages teens and forms teen's perception of belonging not just for their teen years but for most of their adult life.
- **Tourists:** Luminescent materials could make the *Discovery Sails* project a unique artwork for Portugal's glass city. The exclusivity of this work will provoke the curiosity of the people in other cities; therefore, in a way, it can improve the economy of the city by attracting tourists and investments.
- **Glass artists and glass art trainees:** Installation of this glass artwork in the city encourages artists and glass art trainees to broaden their minds on big scales. It also gives them the confidence to visualize and create glass artworks for public spaces instead of merely thinking about the fragility of glass and creating small pieces.

- **Partners and sponsors of the project:** For the *Discovery Sails* project, I communicate with several companies and training/research centers, to assist in providing space to work and material to experiment with. They will provide luminescent frits (Nemoto), part of luminescent stones (AGT™), kiln and space for creating the glass panels (Cencal), and devices to experiment with glass art techniques for the project (VICARTE and FBAUP). In return for their contribution, this project will support their business with advertising. Their company's logos will be displayed on a panel next to the final artwork as sponsors of the project. Project partners include the following companies and places:
  - **CENCAL:** CENCAL is the only training glass center in Portugal that runs different workshops (please refer to chapter 3.2). This training center is located in the industrial area of Marinha Grande. Therefore, it facilitates creating and working on this glass artwork for me. Moreover, it decreases the transportation costs and the risk of breakage during transportation of the glass panels from the place where it is created to the place where it is going to be installed. Joana Silva, the training coordinator of CENCAL, said that CENCAL could provide a bigger Kiln and space for creating the glass panels for the project<sup>149</sup>.
  - **VICARTE:** *VICARTE Glass and Ceramics Research Unit* is a research center established on a partnership between the Faculty of Sciences and Technology of New University of Lisbon and the Faculty of Fine Arts of the University of Lisbon. The research at VICARTE connects the present with the past by developing new materials for contemporary glass art and ceramics as well as studying the traditional and historical production practices and the exploration of different aesthetical concepts in art. VICARTE could support the project with technical issues and devices.
  - **FBAUP:** All the researches and glass tests have been carried out at the Faculty of Fine Arts of Porto University under Professor Teresa Almeida supervision.

---

<sup>149</sup> As CENCAL already supported other projects, we have thought about the possibility of supporting us. Of course, protocols need to be established and Joana's supervisors need to agree before the project begins. However, Joana didn't think that is problematic.



Different approaches to painting and applying luminescent frits on the glass panels in the FBAUP are tried and tested.

- **AGT™:** AGT™ is the market leader in high-performance glow aggregates for concrete and asphalt. They guarantee that the AGT™ ultra-glow stone is the brightest photo-luminescent stone available and will continue to glow for over 15 hours after being fully charged for a minimum of 8 minutes under sunlight. I communicated with Keith J. Hart the vice-president sales of AGT™ by email on 11 September 2017 asked to have the samples of AGT™ glow stone free of charge which they accepted and sent them to me. Later I sent them the results of the tests I have done by their samples and on 15 February 2018, I asked if they want to be a sponsor of the project. The AGT™ has agreed to be one of the sponsors of the *Discovery Sails* project by providing 30 pounds of ultra-glow stone except shipping costs.
- **Nemoto:** Nemoto is a company that has been operating in Pombal (a city in Portugal) since 1989. It produces and sells inorganic fluorescent and phosphorescent pigments. The Nemoto Group's activity is governed by the *chemicals for the benefit of the Earth and Mankind* principle. On 12 October 2017, I sent an email and asked for collaboration, if they could send Phosphorescent and luminescent pigments for the test conducted at the FBAUP workshop. Nemoto accepted and sent them free of charge. Later after getting good results, on 15 February 2018, I asked Nemoto to be the sponsor of my project by supporting phosphorescent pigments free of charge. Nemoto has agreed to be one of the sponsors of this project by providing 2000 grams of G-300L700 (Green color) and 1000 grams of BG-300L700 (Blue-Green color) to apply on the glass panels.



### 5.4.3 Consideration of Social Criticisms That Could Be Made Regarding This Public Glass Art

It is not a new phenomenon that citizens immigrate to bigger cities from remote villages or small towns. It means that most of the world's population is now gathering in the cities. This immigration brings many different people with different backgrounds (cultural, political, and religious backgrounds) to live next to each other. Therefore, the public art which is going to be installed in a bigger city with a multicultural population has different concerns in comparison with public art that is going to be installed in a quiet small town such as *Marinha Grande*. The Proposed public glass art project may get less criticism because it is designed to be installed in a small town and does not represent topics such as political and social issues, sexual discrimination, or feministic issues; moreover, it is expected to be installed in the city of glass where most of the people are familiar with glass art.

However, the proposed public glass art project can be criticized by displaying the world map as a reminder of Portugal's exploration periods because some Portuguese citizens remember that colonization was a dark point in the history of Portugal attributable to slavery, although the Marquis of Pombal recognized the *injustice of slavery* in 1761 and abolished slavery in Portugal (Ames, 2018). With this public glass art, I didn't intend to remind the slavery periods, but rather to highlight the bravery of Portuguese sailors in discovering the new lands that generated cultural and social interactions between countries and territories. As an Iranian artist who lived in Iran and came to Portugal to continue education, I remember the *Portuguese Castle*<sup>150</sup> of Hormuz Island which is of the last surviving monuments built by the Portuguese during their colonial rule in the southern part of Iran, near the Persian Gulf in the early 16th century. That castle shows, even with a distance of about 7,000 km far from Portugal, the traces of Portuguese influence from 500 years ago. Therefore, I wanted to remind the traces and influences of Portuguese sailors around the world by my artwork.

One of the things that could be subjected to criticism on this project is why it is not a monument to tribute the glass blowing or glass fabrication in Portugal. I have to mention that

---

<sup>150</sup> The *Portuguese Castle* is also known as the *Fort of Our Lady of the Conception*, is a red stone fortress on Hormuz Island, Iran.

there are already several monuments to glass production in Marinha Grande. I wanted to do something different that could captivate the attention of both residents and visitors, but also the present time, of a globalized culture that resembles what the Portuguese did many centuries ago. So, on uniting glass and the discoveries, I am also celebrating this new XXI century, full of possibilities for cultural changes, communication between people and countries. And glass is one of the most used materials we are applying to facilitate that communication, in smartphones, digital screens, LED-based gadgets, among many other devices.

## 5.5 Preparation Phases Before the Project Execution

### 5.5.1 Ideation and Brainstorm Sketches

The Conceptual idea of glassy sails in this project came up when I visited Marinha Grande city center and nearby beaches, the house of Afonso Lopes Vieira<sup>151</sup> near the São Pedro de Moel beach (Figure 5-12), and when I studied a brief history of Portugal. The conceptual approach to this project is defined by the site, the community, the historical aspects of the region, and the people who inhabit the area. For this goal, I have collected and explored the data of the context, site, and surroundings both physical and non-physical.



Figure 5-12. House of Afonso Lopes Vieira near São Pedro de Moel beach.

---

<sup>151</sup> The house was offered by Afonso Lopes Vieira's father as a wedding gift, to the poet and his wife, D. Helena Aboim, in 1902. They lived here for long periods of time - mainly during the warmer seasons, from April to October - alternating with stays at Casa das Cortes and Casa de Lisboa (Nobre, & Magalhaes, 2010).

Afonso Lopes Vieira was a Portuguese poet and novelist who was born on January 26, 1878, in Leiria and died on January 25, 1946, in Lisbon. Graduated in Law at the University of Coimbra. Between 1900 and 1919, he was editor of the Chamber of Deputies, and, from 1916, he dedicated himself exclusively to literature and cultural action. He retired at his home in São Pedro de Moel where he usually spent his holidays with his family since his early life up to 1945 and received several friends, also writers, and traveled through Spain, France, Italy, Belgium, North Africa, and Brazil (“*Afonso Lopes Vieira* in *Infopédia*”, n.d.). Once I visited Afonso's house in São Pedro de Moel, I was fascinated by the tile panel *Nau Catrineta* on the exterior wall on the west facade, under the balcony of Capela building of Afonso Lopes Vieira Museum House, which is built around 1918 and 1922. The inscription is “A minha alma é só de Deus/ e o corpo da água do mar (My soul only belongs to God/ and my body to the water of the see)” (Nobre, & Magalhaes, 2010) (Figure 5-13). Another tile panel *Nau Catrineta* is on the wall of Casa ALV of Afonso Lopes Vieira Museum House and built on 1916. The inscription is “A minha alma é só de Deus/ e o corpo da água do mar (My soul only belongs to God/ and my body to the water of the see)” (Nobre, & Magalhaes, 2010) (Figure 5-14). *Nau Catrineta* is an anonymous romanticized poem, linked to the oral and communicative tradition that, according to *Almeida Garrett*<sup>152</sup>, was probably inspired by the tumultuous voyage of the ship Santo António, which carried Jorge de Albuquerque Coelho, from the port of Olinda, in Brazil, to the port of Lisbon, in 1565 (“*A Nau Catrineta* in *Infopédia*”, n.d.).

According to several occasions in the correspondence and poets of Afonso Lopes Vieira, he refers to his house as *Nau Catrineta* (Nobre, & Magalhaes, 2010). For example, Afonso Vieira in the book *Onde a terra se acaba e o mar começa* refers to his house as *Catrineta house (Casa Catrineta)*:

“Casa Catrineta,  
desprende-te enfim do chão,  
entra-me pelo mar

---

<sup>152</sup> “João Baptista da Silva Leitão de Almeida Garrett, viscount de Almeida Garrett, (born Feb. 4, 1799, Porto, Port.—died Dec. 9, 1854, Lisbon), writer, orator, and statesman who was one of Portugal’s finest prose writers, an important playwright, and chief of the country’s Romantic poets” (<https://www.britannica.com/biography/Joao-Baptista-da-Silva-Leitao-de-Almeida-Garrett-visconde-de-Almeida-Garrett>).

e lá ao largo vai naufragar  
 para ir ao fundo com o meu coração!  
 Oh! não poder arrancar-te do chão!  
 E, gageiro, embarcar  
 em ti, meter-te ao mar  
 para ir naufragar,  
 para ir ao fundo com o meu coração!...”(Vieira 1940, p 86).



Figure 5-13. Nau Catrineta. OAL/Maria Leonor. Capela building of Afonso Lopes Vieira Museum House, Marinha Grande, Portugal. Around 1918 and 1922. (Nobre, & Magalhaes, 2010).



Figure 5-14. Nau Catrineta. OAL/Maria Leonor. Casa ALV of Afonso Lopes Vieira Museum House, Marinha Grande, Portugal. 1916. (Nobre, & Magalhaes, 2010).

House Museum of Afonso Lopes Vieira has several tile panels on the walls around the buildings such as the ex-libris<sup>153</sup> of Afonso Lopes Vieira panel (Figure 5-15). In Figure 5-15, the conch shell (above) and the scallop shell (below) is ex-libris of Afonso Lopes Vieira which is applied in various locations on the outside of the building alongside the entrance of the home of Afonso Lopes Vieira. It dates back to around 1918-1922. Afonso’s first ex-libris was the image of the rose and the ears of the wheat as the frame of the frontispiece of his book *O Pão e as Rosas* from 1908. After that, from 1922 until his last book of poetry in 1940 *Onde a terra*

<sup>153</sup> According to Oxford dictionary, ex-libris is “an inscription, label, or stamp indicating the owner of a book; esp. a label or stamp of this kind artistically designed, bearing, e.g. the person's arms or crest, or some emblematic device; a book-plate or the like” (Oxford Dictionary).

*se acaba e o mar começa* (where the land ends and the sea begins), the ex-libris of the conch shell and the scallop appear in Afonso books.



Figure 5-15. The conch shell (above) and the scallop shell (below) in this panel is ex-libris of Afonso Lopes Vieira which is applied in various locations on the outside of the building alongside the entrance of the home of Afonso Lopes Vieira. Date back to around 1918-1922. ©Parinaz Faghihi.

Most of the tile panels in Afonso's house are associated with sea in blue color which is the most seen color in Portuguese tile. When I came to Portugal, the first thing that captured my eyes was the blue tiles in architecture known as Azulejos. Azulejo is one of the most emphatic expressions of Portuguese culture and is certainly one of its most original contributions to the world's artistic heritage (Sabo & Falcato, 1998). By using the blue colour of Azulejos in the sails, I determined to manifest the glory of the Portugal's Age of Discoveries.

Demonstrating the sails of caravels as a symbol of the Age of Discovery is also what other artists did. For example, in *Monument to the discoveries (Padrão dos Descobrimentos)* (Figure 5-16) which was designed by architect Cottinelli Telmo with sculptures by Leopoldo de Almeida, the figures standing on a ship and Henry the navigator at the prow keeps a Portuguese caravel in his hands. This statue was built in 1960 to commemorate the 500th anniversary of the death of Henry the Navigator. The figures are those who engaged in the establishment of the Portuguese age of discovery including Vasco da Gama, who opened a



sea route to India in 1498; Pedro Álvares Cabral, discoverer of Brazil in 1500; and Fernão Magalhães (Magellan), who crossed the Pacific in 1520 (“Monument to the Discoveries”, n.d.).



Figure 5-16. Padrão dos Descobrimentos (Monument to the Discoveries). Designed by architect Cottinelli Telmo with sculptures by Leopoldo de Almeida and Soares Branco and António Santos as assistants. Inauguration 1960. Height – 56m; Width – 20m; Length – 46m. (“Monument to the Discoveries”, n.d.).

The effect of the aforementioned observations and research helped me to develop a public glass art project with glassy sails. The first conceptual idea was to draw and design the sails in an abstract form. Then, I thought the sails could be covered with Portuguese Azulejos tile patterns. when I came to Portugal, the most attractive part of Portuguese art and architecture for me was Azulejos, which could be seen everywhere in Portugal (Figure 5-17). Then I found how to execute the patterns of Azulejos, and print it on the glass panels, while the technical possibility of digital printing in Portugal was not convincing (For more information about technical possibilities please see section 5.5.3).

Therefore, I decided to keep the blue color of Azulejos (instead of all the tile patterns), sails on a big scale, and add a world map on the sails with luminescent frits standing on a basement of luminescent stones.

The reason for using luminescent stones like waves in the cement basement for this project was their specific features. They are Eco-friendly materials, Solar power energy saving during the day, and perfectly glow during the night for longer hours than luminescent glass frits.

Moreover, the light that they produce is glowing in blue and green colors which reminds reflecting the light of the stars at night on the waves of the sea.

The primary brainstorm sketches to ideate the Discovery Sails project are displayed in Figure 5-18, Figure 5-19, Figure 5-20, Figure 5-21, and the primary digital simulation is displayed in Figure 5-22.

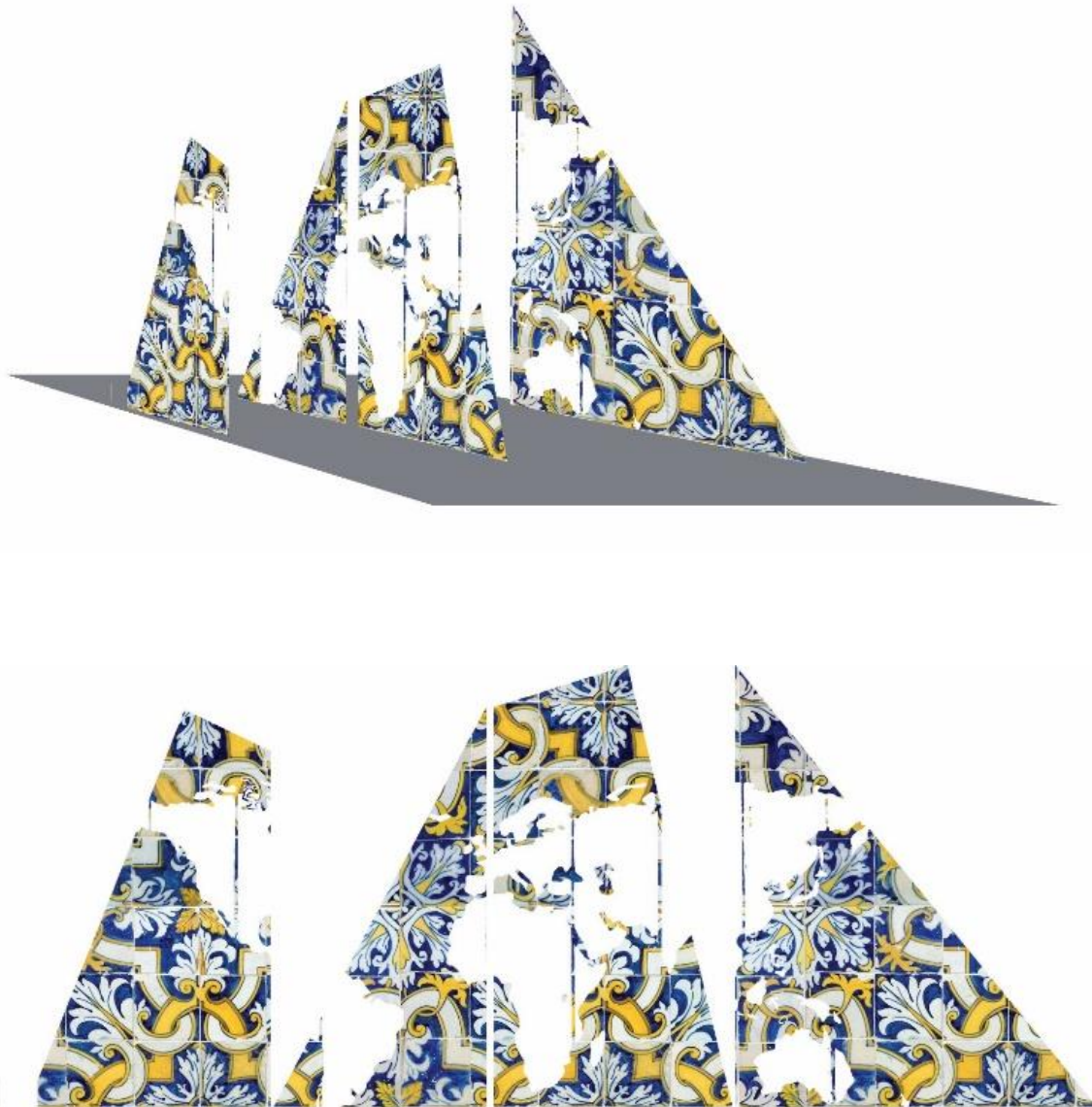


Figure 5-17. Primary digital simulation of Azulejos on the Sail Discovery project. ©Parinaz Faghihi.

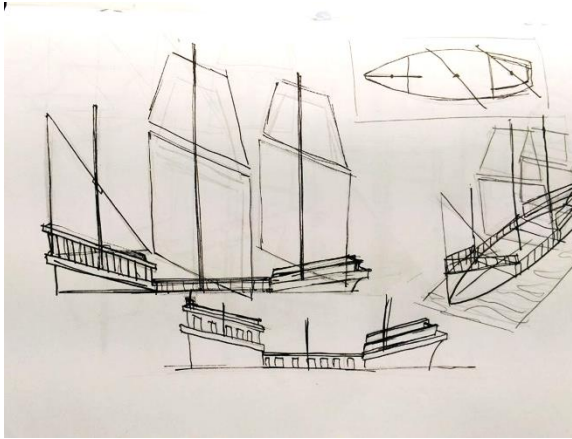


Figure 5-18. The primary sketches. ©Parinaz Faghihi

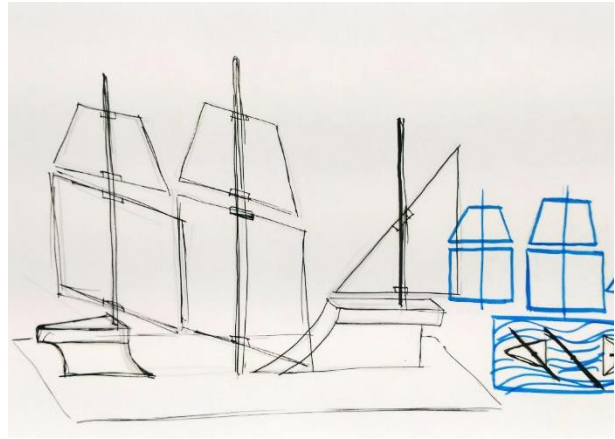


Figure 5-19. The primary sketches. ©Parinaz Faghihi.

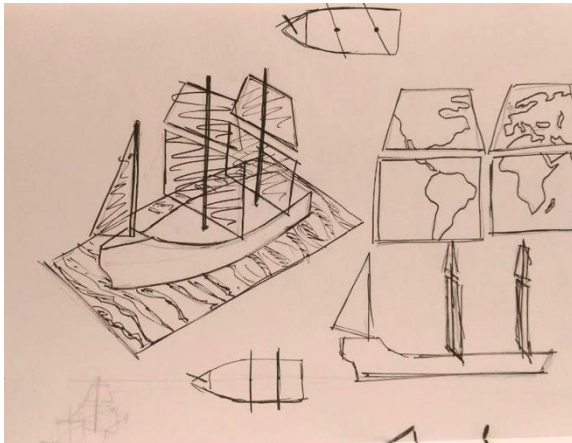


Figure 5-20. The primary sketches. ©Parinaz Faghihi.

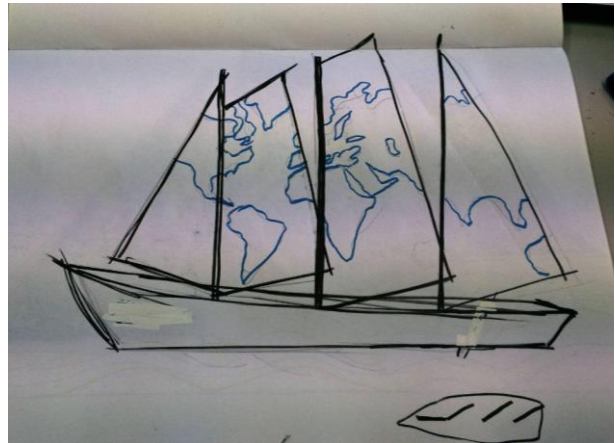


Figure 5-21. The primary sketches. ©Parinaz Faghihi.

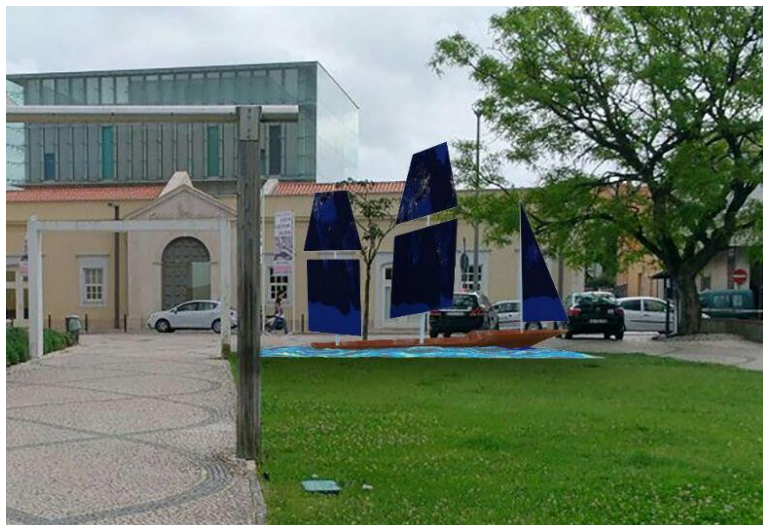


Figure 5-22. Primary digital simulation of the Sail discovery in site number 1. ©Parinaz Faghihi.

For this project, I decided to use luminescent stones and luminescent glass frits as environmentally friendly materials to encourage and attract people for using eco-friendly materials. These materials required no electricity, saving the energy from the sun and glowing in the dark. Also, lightning in the darkness provides a specific effect that is different from lightning produced by electricity. Its light is mysterious and natural which I like the most.

### **5.5.2 Design and Digital Simulation**

In the first phase, the information about the subject and place is analyzed and the primary ideas of the *Discovery Sails* project came up. After the initial inspirations, evaluating and summarizing the ideas, the most genuine idea is selected. In the second phase, the chosen idea is more developed. Moreover, the digital simulation of the project and technical possibilities for its executing have been investigated.

The *Discovery Sails* project consists of four glass panels with dimensions of approximately 200cm height in 150cm width. The glasses are in the shape of sails standing next to each other. The panels will show a world map reminding the golden age of Portugal, Portuguese sailors, and seafarers who explored the world by their ships and caravels. The blue color of the glass panels reflects the blue color of Portugal's traditional Azulejos as well as the blue color of the Atlantic Ocean. In the foreground, a map of the world is planned to be created with luminescent frits that reflects the light of the world's continents at night. For the basement, the luminescent stone of the AGT™ will be used with wavy patterns. In figures 23 to 26, the sketches are shown, and the digital simulations of the project are in figures 27 to 31 and 33 to 36. More technical details are in figures 37 to 41.

The marine motif in the left downside of the first left sails (Figure 5-32) demonstrates the Ex-Libris of Afonso Lopes Vieira. This specific motif is chosen based on Afonso's works which are effectively associated with the beach of S. Pedro de Moel. Moreover, the sea was one of his favorite literary themes. This motif reflects the link with the poetry of Afonso, and also with Portugal's sea and seafarer.

The map of the world in each glass panel will be separated from the tropical circle latitude line by a thin metal frame (Figure 5-24). Due to the limited facilities such as the size of the glass kiln, instead of one glass panel, we have to divide the glass panel into two parts and



connect them with a metal frame in each sail. According to my communication on 8<sup>th</sup> of March 2018 with Joana Silva the coordinator of Cencal (where it is planned to use the kiln and create the glass panels), it is better to have two separate glass pieces instead of one large glass piece in each sail panel because of the technical conditions offered by Cencal: the kiln that will fuse the glass panels still has to be adapted for this purpose. She said that due to the size of the kiln, it is possible to have one glass piece for each sail panel while there needs to have 2, 3, or more assistants for putting glass panels in and out of the kiln (Silva, personal communication, 8 March, 2018).

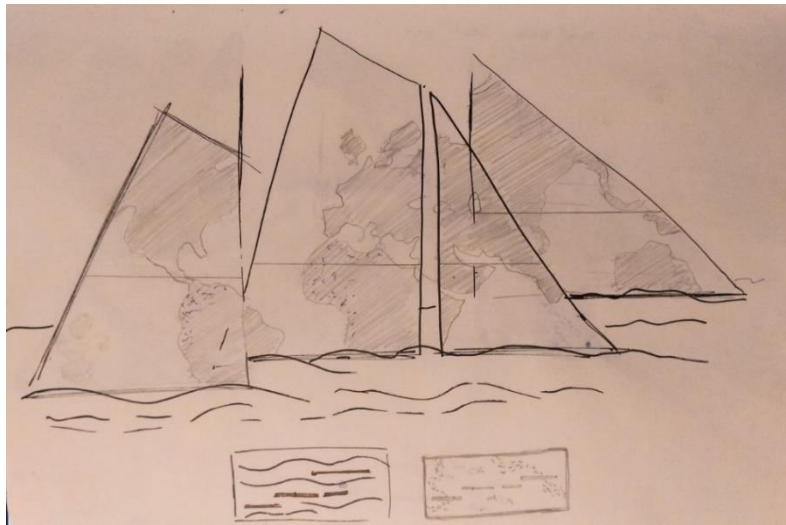


Figure 5-23. Freehand sketch for the project. ©Parinaz Faghihi.

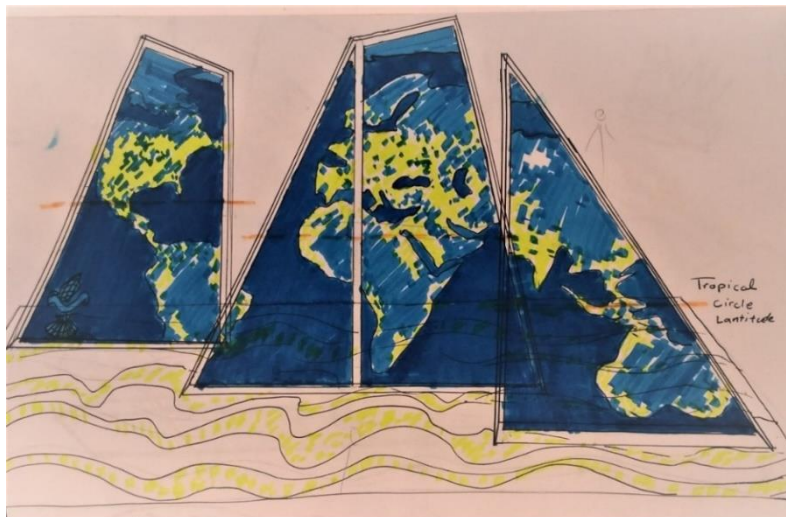


Figure 5-24. Sketch for the project. ©Parinaz Faghihi.



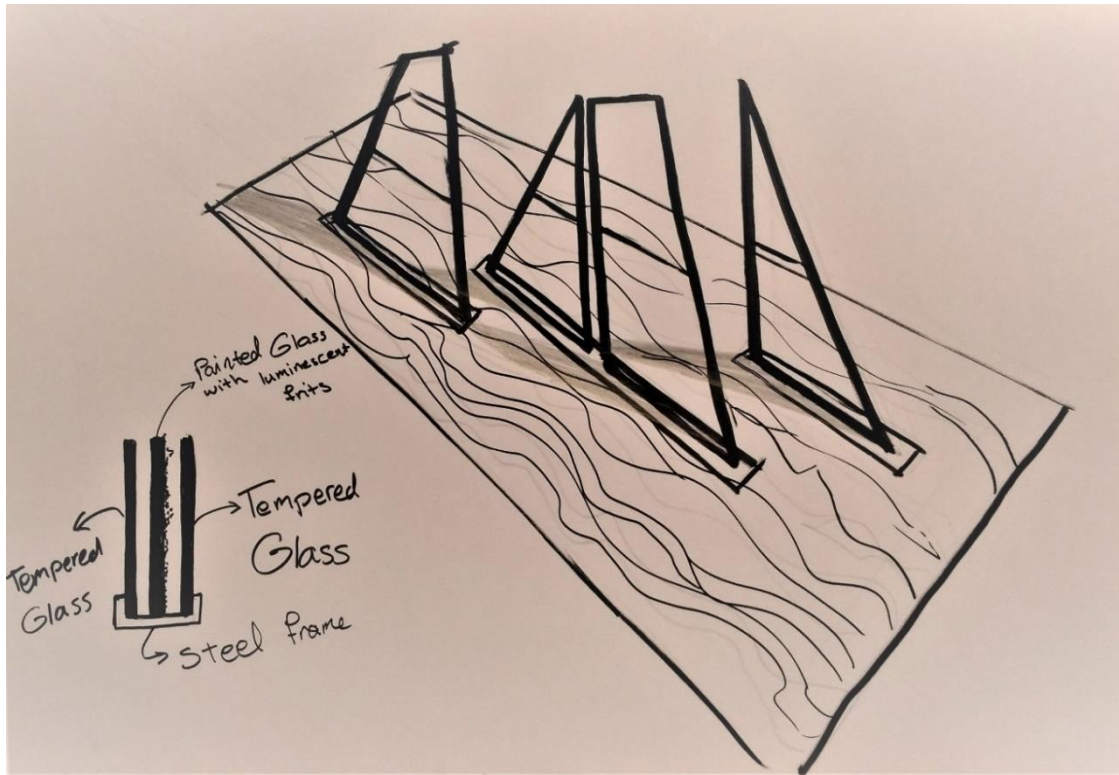


Figure 5-25. Sketch for the project. ©Parinaz Faghihi.

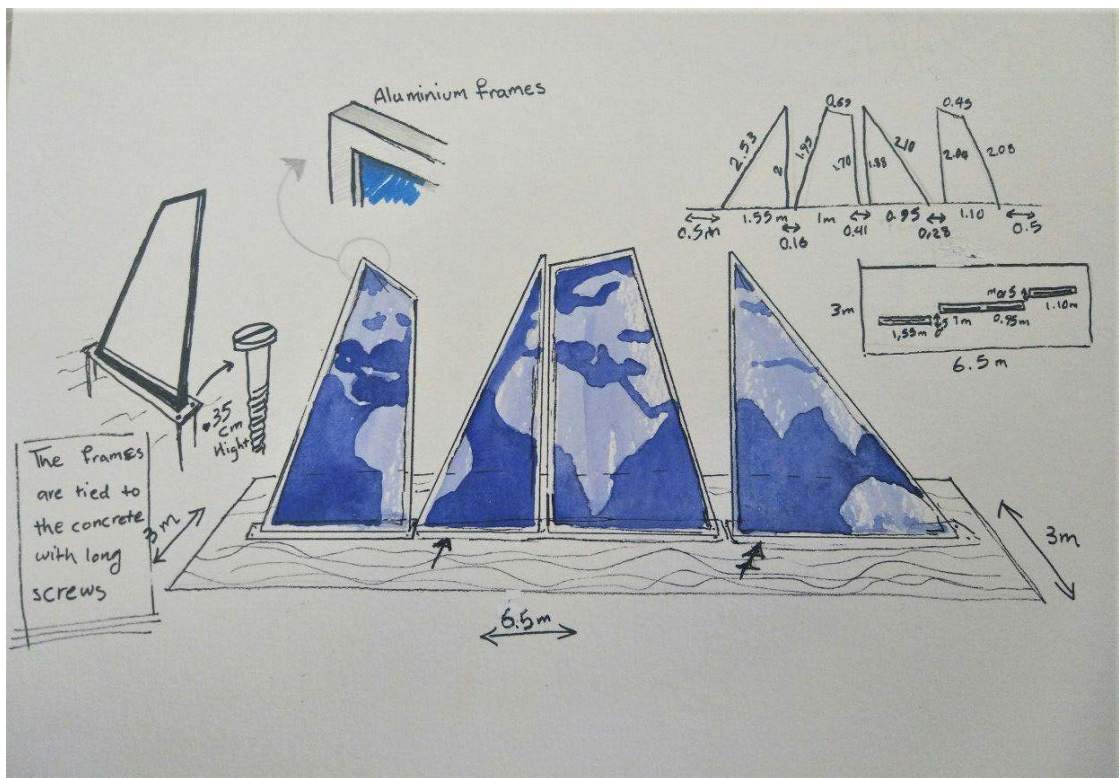


Figure 5-26. Final sketch for the *Discovery Sails* project. ©Parinaz Faghihi.



Figure 5-27. Simulation of the placement of project in site number 1 at night from the eastern perspective- compare with the human scale. ©Parinaz Faghihi.

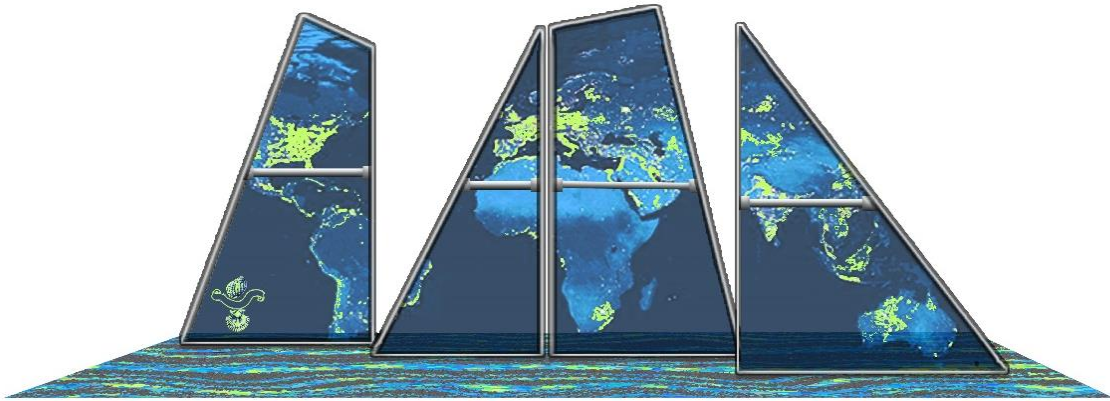


Figure 5-28. Front view of the project at night without needing any light sources. ©Parinaz Faghihi.



Figure 5-29. Front View of the project in daylight. ©Parinaz Faghihi.



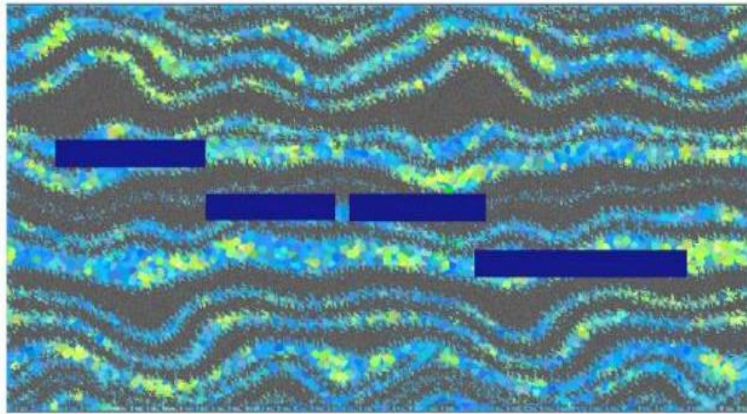


Figure 5-30. Top view of the project at night. ©Parinaz Faghihi.

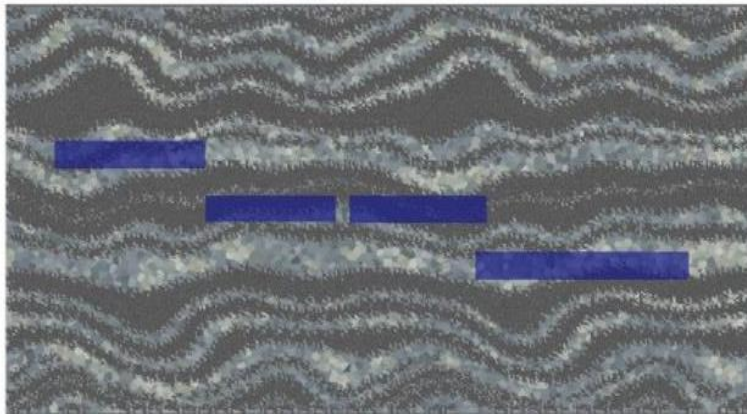


Figure 5-31. Top view of the project during the daylight. ©Parinaz Faghihi.



Figure 5-32. The ex-libris of Afonso Lopes Vieira motif as an inspiration. ©Parinaz Faghihi.



Figure 5-33. Simulation of the placement of the Discovery Sails project in site number 1 in daylight from the western perspective. ©Parinaz Faghihi.

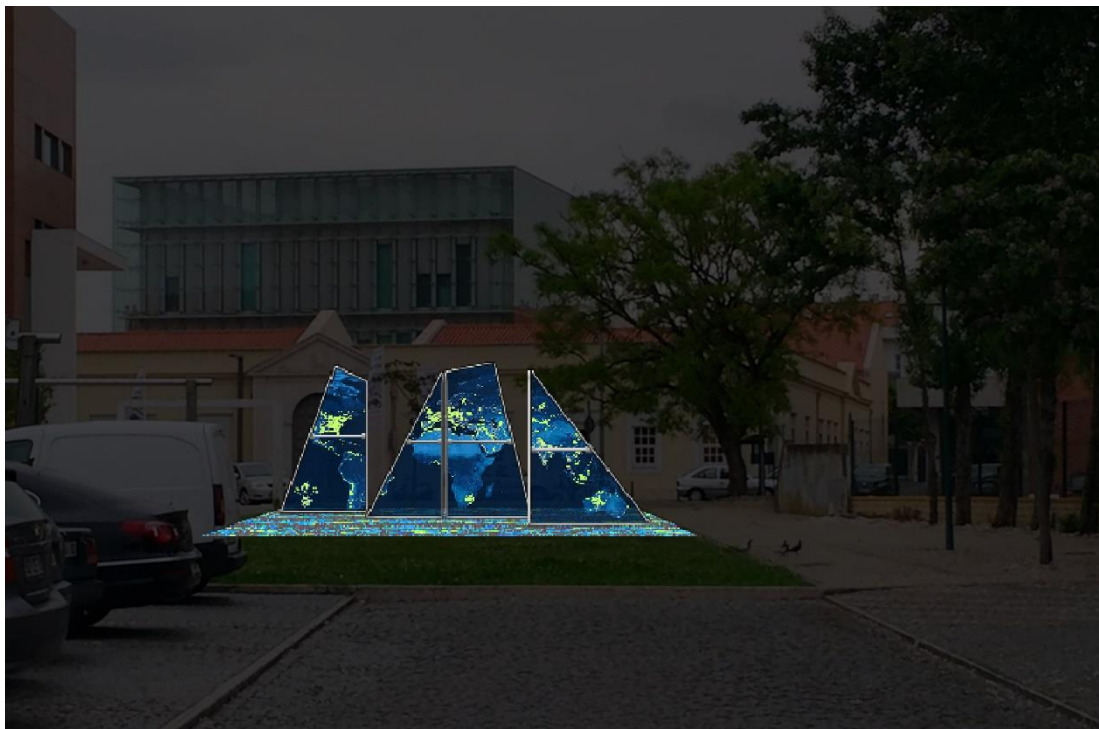


Figure 5-34. Simulation of the placement of the *Discovery Sails* project in site number 1 at night from the western perspective. ©Parinaz Faghihi.





Figure 5-35. Simulation of the placement of the *Discovery Sails* project in site number 2 in daylight.  
©Parinaz Faghihi.

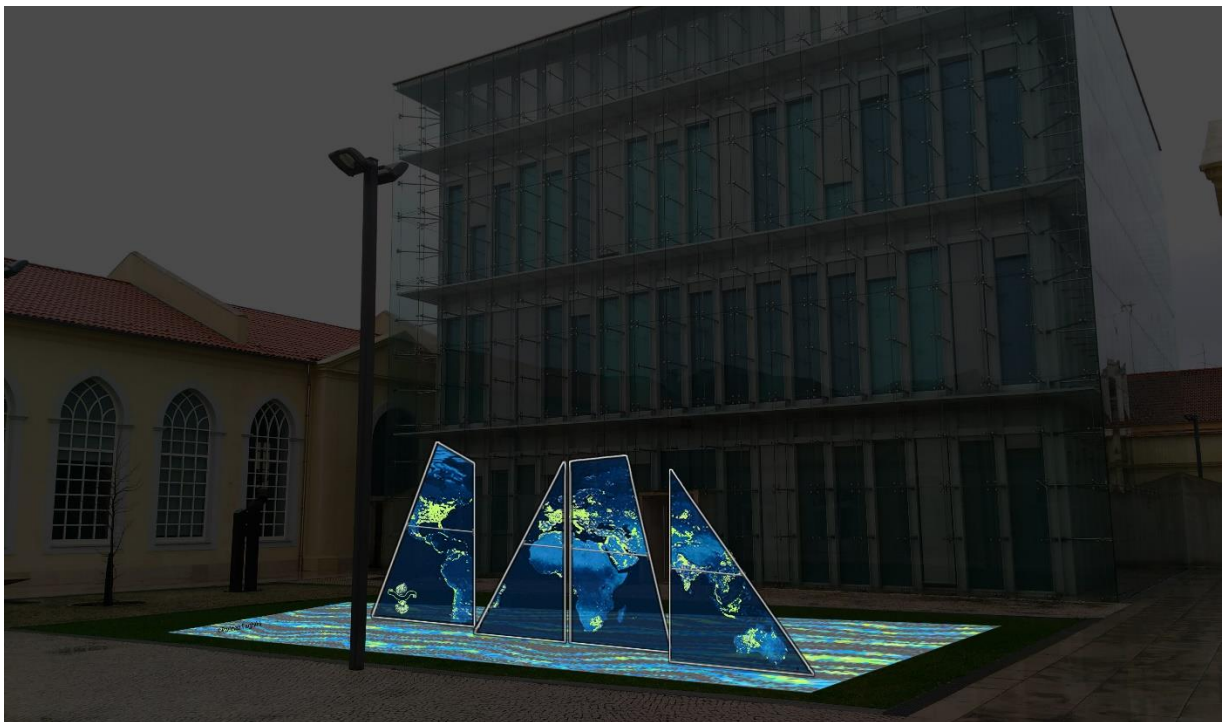
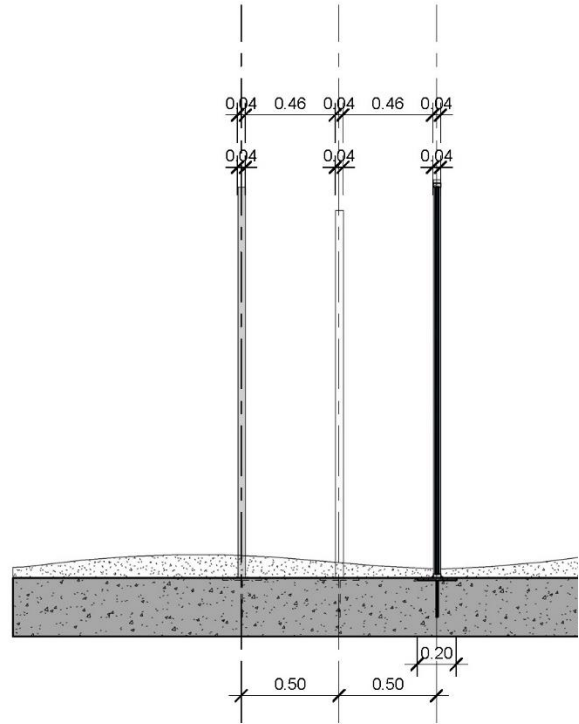


Figure 5-36. Simulation of the placement of the *Discovery Sails* project in site number 2 at night.  
©Parinaz Faghihi.



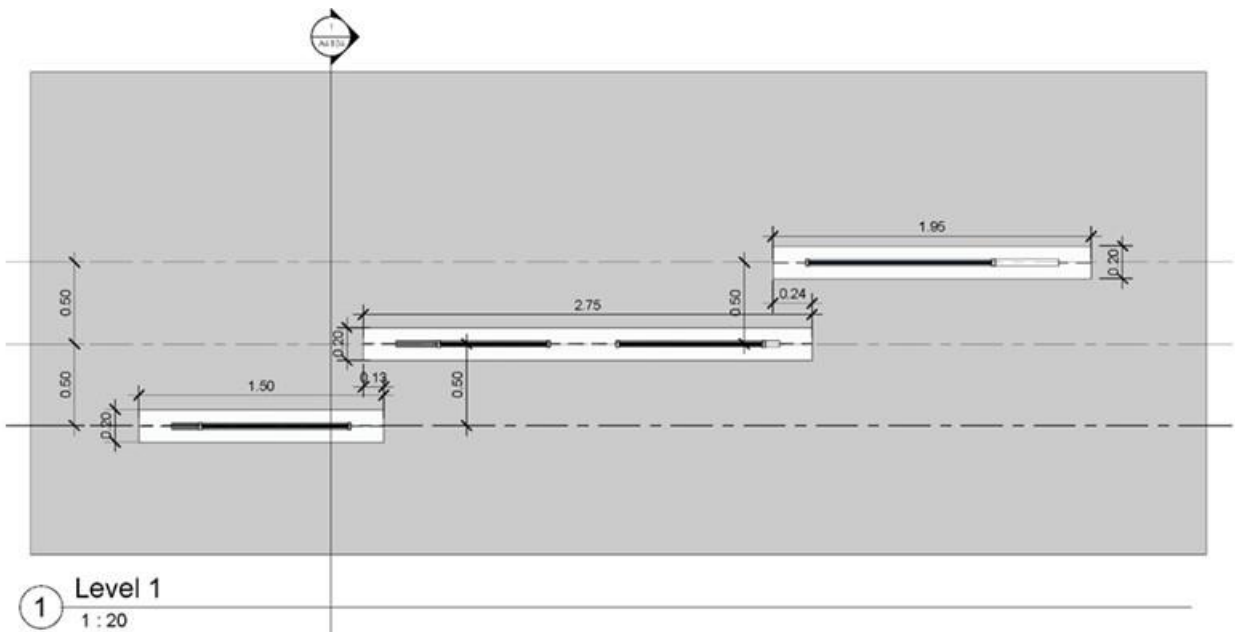


Figure 5-37. Steel frame and tempered glass.



1 Section 1  
1 : 20

Figure 5-38. Details of the project from the side view.



1 Level 1  
1 : 20

Figure 5-39. Detail of the project from the top view.

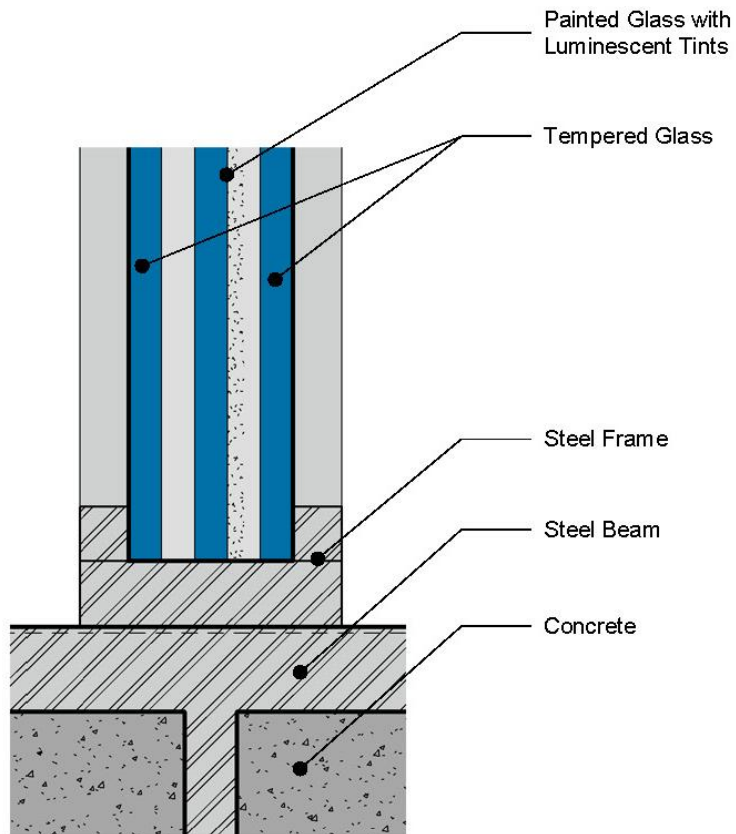


Figure 5-40. Detail of the tempered glass, painted glass, steel frame and beam, concrete

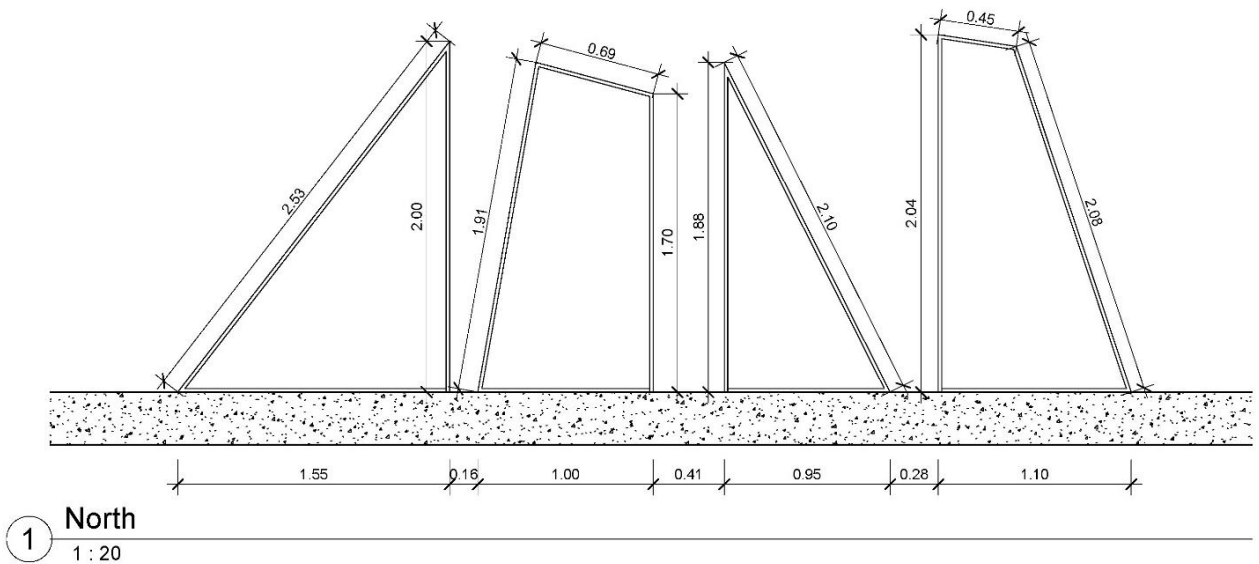


Figure 5-41. Detail of the project from the front view.

### 5.5.3 Technical Possibilities

The third phase of the project is about discovering the best technical approaches to conduct the work. For this purpose, the glass art techniques suitable for creating this project, as well as the possible ways of creating luminescent effects on the glass panels were studied and tested carefully. There have always been many choices for implementing the idea of an artwork, while the most efficient approach in the *Discovery Sails* project is to plan and consider the attainable and accessible budget and facilities. For example, digital printing, silkscreen printing, painting, airbrush painting, waterjet cut, and fusing are some of the possible techniques to execute the world map on the glass panels.

For the luminescent parts of the glass panels, some tests were conducted. As far as the available luminescent glass frits in the market (such as Nemoto luminescent glass frits) are less glowing in dark in comparison with luminescent sands and stones of AGT™ company (Figure 5-42) (Figure 5-43), several tests were carried out to check the possibility of implementing the luminescent options on glass panels.



Figure 5-42. luminescent sands and stones sample of AGT™ company in daylight. ©Parinaz Faghihi.



Figure 5-43. luminescent sands and stones sample of AGT™ company in dark space after 1-hour exposer to the daylight. ©Parinaz Faghihi.

First, the possibility of using luminescent sands and stones of AGT™ company was explored by using the fusing technique. For that goal, the AGT™ company products were put in between two layers of 3mm thickness glass, and in some samples, the luminescent sands and stones were placed on the top of one 3mm thickness glass (Figure 5-44). The samples were fired in MV7 kiln that as the resistances on the top at two different temperatures: first 820° and then 850°. In both temperatures, the luminescent sands and stones did not fuse and did not fix to the glass meanwhile, they were turned into ashes (Figure 5-45). The tests that were performed at 820° and 850° already showed some deformation on the glass shape. It could be possible to fuse the stones on glass at higher temperatures, however we don't fuse the glass in higher temperatures while using float glass. Therefore, the idea of fusing the luminescent AGT™ company on the glass did not achieve a successful outcome. In an email discussion with Keith Hart, the Vice President Sales of AGT™ company, she recommended using adhere instead of fusing luminescent stones on the glass. She said that with poly aspartic adhere, we can get better results in small sizes of AGT™ luminescent particles and the clear epoxy are perfect for big and small particles (Hart, personal communication, 11 December, 2017). In adhering luminescent sand/stone on glass for outdoor public art, special attention should be paid, such as using a glue that is more durable, strong, and resistant to outdoor conditions. For that matter, Inês Coutinho (whose Master thesis<sup>154</sup> was about epoxy resins and their aging) was consulted and asked about adhering sand and stone on the glass surface. She stated that the UV curing resins and other available glues on the market might be suitable for outdoor use, but it is anticipated that the assembly may encounter specific problems within a few years (4 to 5 years) since such glues are designed for indoor usage. She added that silicones for outdoor usage are more resistant to sun and rain exposure (Coutinho, personal communication, 10 October, 2017). Finally, regarding the tests that have been conducted, we determined not to use AGT™ products for luminescent parts of glass panels, because fusing or gluing these products on glass panels are not desirable for this project.

---

<sup>154</sup> Coutinho, I. (2008). *Resinas epoxídicas-estudos de envelhecimento acelerado e sua aplicação em Conservação e Restauro de vidro* (Master degree dissertation, FCT-NOVA).



Figure 5-44. The prepared samples of AGT™ luminescent products before firing in the kiln. ©Parinaz Faghihi.

Afterward, the Nemoto luminescent glass frits were tested on 3mm-thickness-glass with three different degrees: 600°, 800°, and 850°. The following outcomes were noted: at 600° the frits did not fuse on the glass surface at all (Figure 5-46), at 800° did not fuse very well, and at 850° we finally achieved a favorable outcome while still, the granular texture remained on the glass surface (Figure 5-47). We can say that at 850° we finally achieved a favorable outcome while still, the granular texture remained on the glass surface. Using the Nemoto frits at 850° is an acceptable result for this project.

Based on my field research conducted among all of the possible techniques, digital printing on glass was not an attainable option in this project. The lack of a large-scale kiln and a mechanical vacuum gripper machine (for moving large glass panels) in Portugal's digital ceramic printing companies were the reasons why digital printing was not practical and suitable for this project.

Silkscreen printing is another option to create glass panels. Silk screen printing on a big scale glass panel requires special equipment including a frame, squeegee, exposure unit, and a table for screen printing, and also one or two assistants are needed. After evaluating the potential places to build the glass panels (CENCAL, FBAUP, and VICARTE), we realized that



currently none of them has the equipment, enough space, and facilities for large-scale silk screen printing on glass.



Figure 5-45. Result of fusing luminescent sand and stones of AGT™ company in 820 degrees and 850 degrees. ©Parinaz Faghihi.

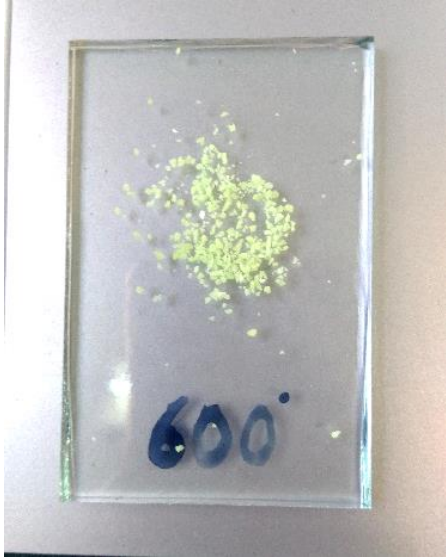


Figure 5-46. Fused Nemoto luminescent green frit on 3mm normal float glass at 600°. ©Parinaz Faghihi.



Figure 5-47. Fused Nemoto luminescent green frit on 3mm normal float glass at 850°. ©Parinaz Faghihi.

We also evaluated and tested the possibility of Airbrush painting on the glass panels. In this experiment, we used the airbrush from the ceramic workshop in the Faculty of Fine Arts of the University of Porto that has a bigger cup (the paint container) and compressor in comparison to the airbrush of the glass workshop (Figure 5-48).



Figure 5-48. Airbrush in the ceramic workshop in the Faculty of Fine Arts of the University of Porto. ©Parinaz Faghihi. 22.01.2018.

The first sample was fired twice; the first time for fusing the frits and the second time for painting. In Sample 1, the green luminescent frits from the Nemoto company were fused on a 4mm float glass for 6 hours up to 850° C (Table 1). This experiment resulted in a textured luminescent frit stuck on the opaque effect glass (Figure 5-49). Then the luminescent parts were covered by liquid masking film and painted by airbrush and went in the kiln for 6 hours up to 600° C (Table 2) (Figure 5-50). In this stage, the dark blue enamel powder (Azul Oscuro 580°-630° 422021013) was mixed with Decoflux and we used the stained glass kiln with the resistance on the bottom. However, the outcome of this experiment was not our desired result, because the glass has lost its transparency and the blue color of the sample was very dark and opaque.

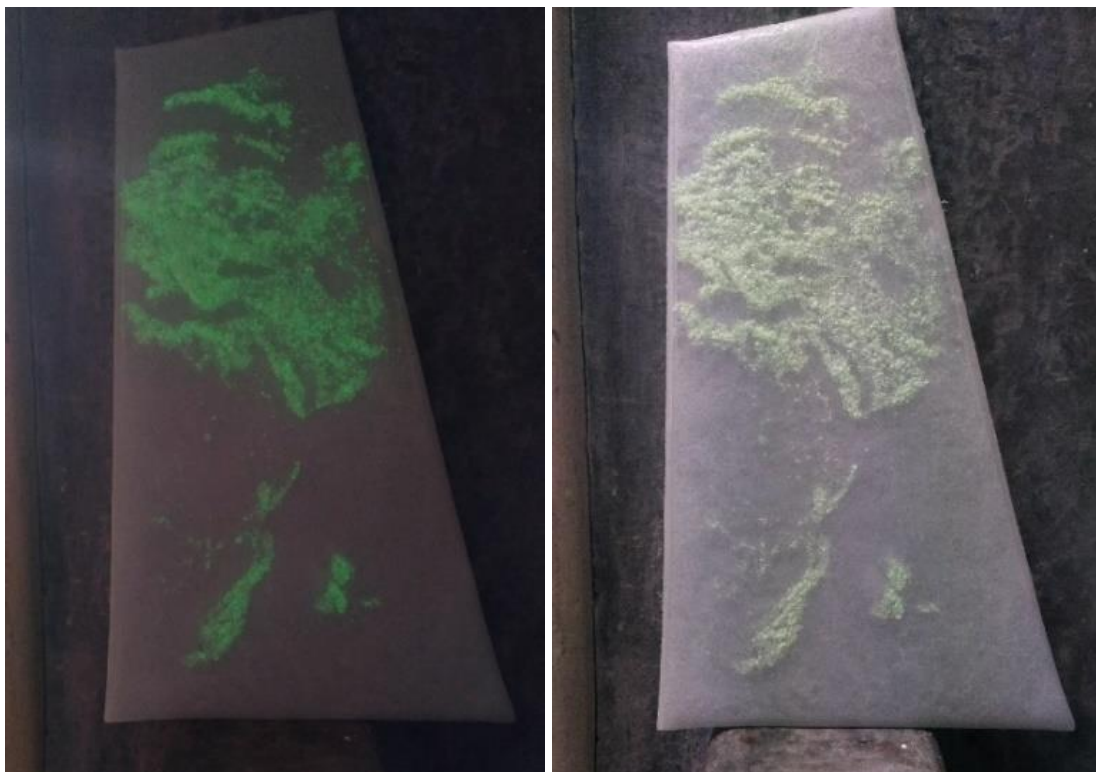


Figure 5-49. Sample 1: Green luminescent frit (from the Nemoto Co.) on 4mm normal float glass in daylight and dark space using the Fusing technique. ©Parinaz Faghihi (23.01.2018).





Figure 5-50. The process of making Sample 1. The luminescent parts are covered by liquid masking film, painted by airbrush, and fired in the kiln. ©Parinaz Faghihi (23.01.2018).

Table 1. Program of the kiln for fusing.

Hours	Ramp	Temperature
6 hours	↑	850°
30 Minutes	↔	850°
↓Skip	↓	30°

Table 2. Program of the kiln for fixing the paint on the glass.

Hours	Ramp	Temperature
6 hours	↑	600°
30 Minutes	↔	600°
↓Skip	↓	30°

Sample 2 (Figure 5-51) was made by using a blue powder enamel (Azul PR422022033) mixed with Arabic Gum and airbrushed on 3mm normal float glass. Then the blue and green frits are spread on it and fired in the kiln up to 850°C (Table 3). We produced sample 2 to visualize the glass with some clear surface (without paint), as well as to understand how the

paint would react when mixing with the Arabic Gum medium. The result was successful, but the paintless part was not desirable for the world map.

Table 3. Program of the kiln for fusing.

Hours	Ramp	Temperature
8 hours	↑	850°
30 Minutes	↔	850°
↓Skip	↓	30°

In sample 3, first the turquoise blue powder enamel (Azul turquesa 780°- 850°C) is mixed with Decoflux and airbrushed on 3mm normal float glass; then, went in the kiln to just fix the color at 600°C (Table 2). Then, the green powder enamel is highlighted with the airbrush. The luminescent Nemoto frits were added and the samples were fired 6 hours in the kiln at 850°C<sup>155</sup>, using the same program display in table 1. The result was not successful because the combination of the blue color and green highlight was not desirable (Figure 52).

In sample 4, another type of glass was used, the Artistica glass and the color chosen was blue. The idea was to have a colored glass and not a clear glass (like the float glass), so the background of our panels was already blue. White opaque (422022183-780°-850°) from the Pepe Rios company was used for painting the world map (Figure 5-53), and turquoise blue powder enamel (800°) is mixed with Decoflux medium, then airbrushed on blue Artistica glass. At last, the sample was fired in the kiln up to 850°, using the same program in Table 1. Sample 4 on blue Artistica glass shows it is not the desired result in comparison with an optical glass that is painted blue with an airbrush. The reason why I have not chosen blue Artistica glass is that I prefer to see a kind of semi-transparent highlights and various shades of blue, while blue Artistica glass is fully opaque so I can not achieve my desired outcome.

---

<sup>155</sup> Technically, we do not fire glass in low temperature on the first firing and with higher temperature in the second firing. However, in this samples, we just wanted to fix the paint on the glass surface (600°C). After the first firing, we add extra paint with airbrushed and also the luminescent frits. Finally, the sample was place on the kiln one more time with higher temperature (850°C).



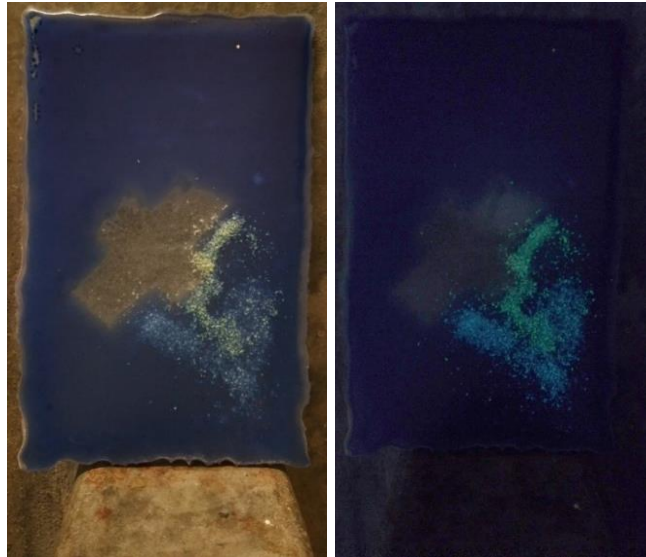


Figure 5-51. Sample 2. In daylight and darker spaces after 2 hours of natural daylight exposure.  
©Parinaz Faghihi. 23.01.2018.

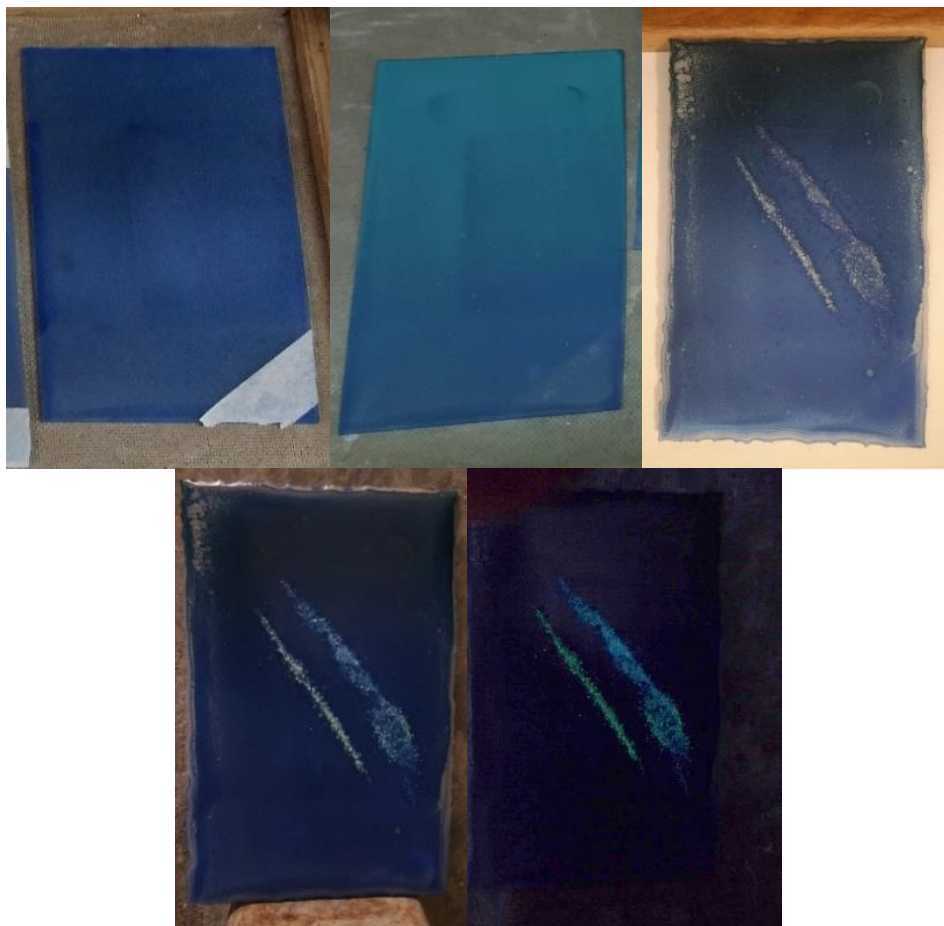


Figure 5-52. Sample 3. The process of making sample 3. The last 3 images demonstrate the result of sample 5 in natural daylight and darker space. ©Parinaz Faghihi. 23.01.2018

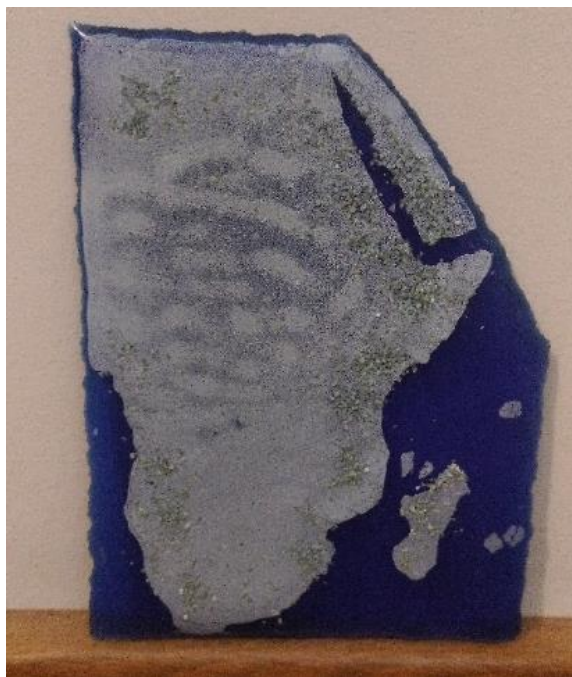


Figure 5-53. Sample 4. In daylight. ©Parinaz Faghihi. 5.03.2018

In samples 5, 4mm optical glass was used and the world map was covered with tape. The enamel used was blue powder enamel (Azul PR422022033) mixed with Decoflux medium, airbrushed on (Figure 5-54 a). Then the samples were fired in the kiln for 6 hours up to 600°C to fix the paint on the glass surface (Table 2). Later, the blue parts were covered again with paper tape, and once again (Figure 5-54 b), the sample was airbrushed with turquoise blue (Figure 5-54 c)<sup>156</sup> and were added blue and green luminescent frits, fired in the kiln for up to 6 hours to reach 850°C, then stayed 30 minutes at 850°C and afterward cooled down (Table 1). The final result of sample 5 was desirable as the blue color of the oceans was acceptable, and the luminescent frits on the map fused very well. The combination of colors, texture, and technique formed a harmonious whole (Figure 55).<sup>157</sup>

---

<sup>156</sup> The turquoise blue powder enamel was mixed with Decoflux and could be fired up to 800°.

<sup>157</sup> Here in sample 5, we did the same thing that we did in sample 3; so, we break the rule (the rule is firing the glass first with the highest temperature then in the next steps, we can expose the glass with lower temperatures). However, in this case, as we did not want to expose our glass twice to a high temperature (avoid a bigger devitrification and deformation). For that reason, we decided to go only at 600°C in the first, a temperature just to fixate the enamel on the glass surface. for the second time, we used higher temperature to have the fused elements and allowing the glass surface to be bright.



(a) Sample 5, covered with paper tape, and painted with airbrush.



(b) Sample 5, covered with tape again and prepared for the second color.



(c) Sample 5. The paints were got dry and the sample was ready to have luminescent frits and then to go to the kiln.

Figure 5-54. The process of making sample 5. ©Parinaz Faghihi. 9.03.2018

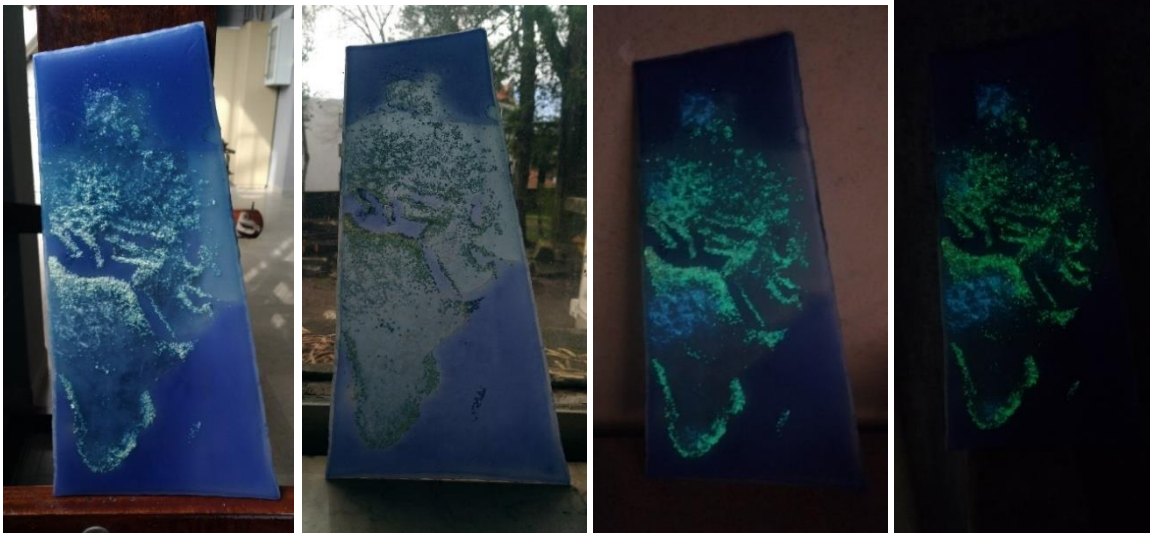


Figure 5-55. The result of sample 5 in daylight and darker spaces after 2 hours of natural daylight exposure. ©Parinaz Faghihi. 9.03.2018

Regarding the aluminum frames to seal all the edges of the glass panels, I had some consideration. One of those concerns was finding a company that was close to the place of creation and installation of the project to reduce transportation costs. However, it was not easy to find such a company. I have contacted different companies in Marinha Grande, Leiria, and Lisbon that make the frames and toughened glass to get the estimated prices of tempered glass and aluminum frames for this project such as GRUPO SOSOARES, Espelhos do Liz, Vidraria dos Peões, Vidreira Cacém, and Cristalmax Industria de Vidro and other suppliers. Until October 2018 none of them answered. Finally, Professor Teresa Almeida introduced a factory in Fafe (a city in the north of Portugal) that makes aluminum frames for the glass panels. To assess the possibilities, I have visited the metal frame making factory (Pressionatecla Unipessoal L.DA) in Fafe (Figure 5-56). Although the company in Fafe was far from Marinha Grande and increased the risk of breakage and the costs of transportation, it was the only factory that answered for getting the estimated price.





Figure 5-56. Pressionatecla Unipessoal L.DA Factory. Fafe, Portugal. ©Parinaz Faghihi (7.9.2011).

In the metal frame making factory, the manager explained that they have various kinds of frames with different thicknesses and cross-sections which are suitable for various usages (Figure 5-57).

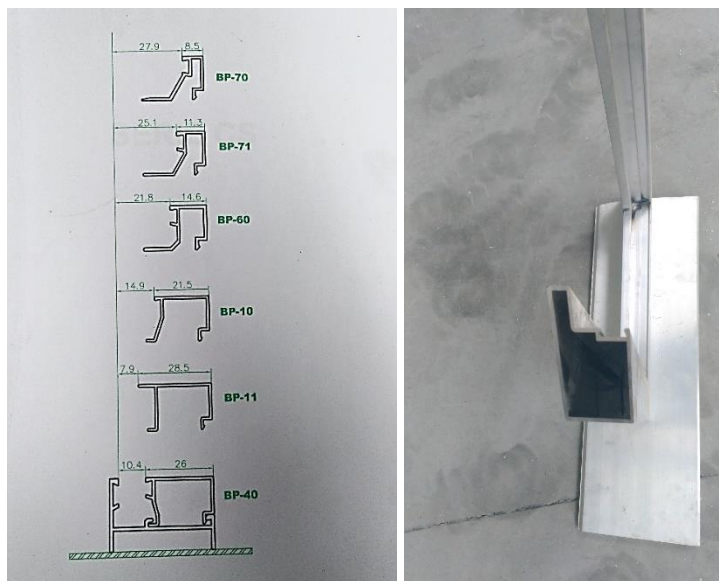


Figure 5-57. These two images demonstrate the various cross-sections for aluminum frames.

Figure 5-58 demonstrates a suitable option (an aluminum frame) that can seal the glass panels and keep three layers of glasses standing straight and safe. Stainless steel and aluminum are good options to create the frames to be installed outdoor. First, I wanted a light



frame that does not disarrange the design; but the manager of the frame-making company advised us to use a robust aluminum frame for safety reasons.



Figure 5-58. An aluminum frame sample for the glass panels.

To sum up this part, it should be mentioned that there are always many possible ways and techniques to execute a project. But the restriction on technical conditions, accessibility of facilities, limitation in time, space, and budget, may change the final design from what was originally designed. For example, in this project, the glass panel of each sail was designed to be one part but because of restrictions of the kiln size, we decided to divide it into two parts. However, the execution of a public glass art project has required an expert and experienced team that collaborates with the artist, engineer, workers, companies, and authority of the place.

## 5.6. Approaches to Prevent Vandalism in The Discovery Sails Project

The approaches to prevent vandalism are reviewed in chapter 4.2. To effectively reduce vandalism in this specific project, the following approaches are presented:

- To organize a workshop at the *Escola Profissional e Artística Da Marinha Grande* and present the project to students and explain why they need to support and take care of public art projects. This workshop introduces how the artist creates and installs a piece of glass artwork in a public space. The workshop can also include practical courses for working and becoming familiar with glass. To hold and organize this workshop, the Municipality and Glass Museum of Marinha Grande are expected to help the artist and arrange an adapted timetable and communicate with the *Escola Profissional e Artística da Marinha Grande*.
- For the Project, toughened glass will be used on both sides of the panel. Therefore, the main glass art will be staying in the middle and between two toughened glass (Figure 5-40). For more protection, the edges of the panels will be sealed by steel frames.
- The cleanness and protection of the artwork site are essential elements. Installing devices such as a CCTV (closed-circuit television camera) is also a practical approach to prevent vandalism in this project.
- All of the suggested project installation sites are situated in the middle of the city near the Glass Museum, Marinha Grande Municipality, and the Cultural Centre. The proximity of such places might reduce the risk of vandalism.

## 5.7 Final Remarks

While this project was planned to be implemented in Marinha Grande, all costs, required budget and expected support were estimated. The details are described in appendixes 1 and 2.

- Appendix 1. The Required Budget and Expected Support for the Discovery Sails Project.

- Appendix 2. Terms of Execution and Delivery of the Discovery Sails Project.

The proposal of the project was proposed to the municipality of Marinha Grande on 17<sup>th</sup> October 2018. On 7<sup>th</sup> April 2020, Tânia Rosa, the director of the Marinha Grande Glass Museum, sent me the Municipality's final decision through an email:

Regarding your project proposal, which deserved our attention and we found it very interesting and a contribution to the dissemination of glass in public art, we will not be able to proceed with the project given that we have no budget to proceed with it. Wishing you success with your study, with best regards (Rosa, Personal communication, April 7, 2020).

Concerning the municipality of Marinha Grande's decision, the idea and the design of the project are taken into consideration but due to lack of budget, its execution was impossible at that time.

The *Discovery Sails* project was the detailed result of the study and the effort of this PhD. It took about two years from 2016 to 2018 to ideate, design, analyze, test the samples, and get the estimated cost of this project. I think this project deserves execution and makes a valuable contribution to the public glass art in Portugal. I am hopeful that the municipality and the glass museum of Marinha Grande can support this project in the future, so we will have the chance to execute the project.

## Chapter 6: Conclusion

In this thesis, we have contributed to understanding the status of glass art in public spaces (as the main material of public art projects), defining public glass art, and what are the approaches to improve it. During this research, we have also struggled to grasp how to answer the initial research question: what is public art?; what is glass art?; if public glass art is a subdivision of public art, what are the debates and issues that should be investigated?; what are the reasons for the lack of public glass art in some countries?; why some countries have more examples of public glass art while in Iran (where I grew up and studied) and Portugal (where I am living and doing the research) public glass art is rarely produced?; what are the reasons behind the public glass art visibility and improvement in Great Britain?; what are the obstacles to the progress of public glass art? To answer the above research questions, we conducted a literature review on contemporary public art and glass art in public spaces in the contemporary urban context. In this chapter, we summarize and highlight the findings of this research to answer the above questions.

### 6.1 Thesis Summary

In chapter one, we have studied public art as a permanent or temporary artwork (including social, critical, political, and contextual art practice) that is commissioned for openly accessible to everyone in public spaces. We have argued that place and space define each other and cannot be understood without one another. We defined 'public space' as an open territory of political, cultural, environmental, social, and economic character accessible to the general public that demonstrates the society's structure in which it operates. We also defined 'urban space' as a series of gradations between public and private use. It is said that in the urban context, space can be divided into four main categories: 1) public, 2) private, 3) semi-private, and 4) collective. Then, the notion and the reason for choosing the contemporary urban

context have been explained. Moreover, we studied the scopes in public art such as cultural, social, political, and economic scopes. In chapter two, glass art in public spaces was divided into three groups: 1) Architectural glass art which refers to the glass art pieces used and connected to architecture (both interior and exterior) and accessible to the public; 2) Sculptural glass art and Glass art installation which refer to the glass-built sculptures or installations installed in public or collective spaces; and 3) Public glass art which refers to public art pieces executed with glass as their main material. We defined each category and gave examples to understand the differences between them. We also studied glass art techniques that have been used in contemporary public glass art, such as stained glass, tiffany, *dale de verre*, film on glass, lamination, screen printing, digital methods, painting, layered glass, lampworking, blowing, etched and sandblasting, kiln forming (fusing and slumping), and kilncasting (casting and sand casting). We presented case studies for each technique, demonstrating an immense versatility in the ways of using glass in public art. Moreover, some modern technologies and their impact on public glass art have been presented. We studied some newly invented contemporary technologies in glass art that could be used in the execution of public art projects such as luminescent glass, glass 3D printer, water jet cutting, and photovoltaic glass.

In chapter three, we have studied approaches to improve glass art in public spaces in Iran, Portugal, and Great Britain. We have chosen Great Britain as a successful country that has multiple examples of glass art in public spaces. We presented a brief history and current state of glass art and public glass art in these countries, settling that in all three there is a long tradition in the glass blowing industry and stained glass as well as the Orsi windows in Iran. Some artists and their public glass art pieces from Portugal, Iran, and Great Britain have also been presented.

In chapter four, we have studied public glass art obstacles such as vandalism and lack of education and proposed techniques to deal with them in public glass art. The state of glass art education in art universities in Portugal, Iran, and Great Britain was studied. Several interviews were conducted with glass art Professors in Portugal, Iran, and Great Britain. We asked them about the state of glass art education and their



opinion about the reasons and consequences of success and failure in the glass art development. Our research proved that art education and glass art education have a great impact on the development of glass art and public glass art. We also discussed that not only education but also economic support, and the economic status of a country, as well as political policies, will effectively influence glass art improvement.

Finally, in chapter five, based on what is studied and investigated during the PhD, a public glass art project was designed to be installed in Marinha Grande (city of glass) in Portugal.

## **6.2 Concluding Remarks on Public Glass Art in Great Britain, Portugal, and Iran**

In all countries that are under comparison in this thesis, we witness a long tradition with glass and considerable glass artworks assets. However, their different attitudes towards political, cultural, educational, artistic, and economic issues, have made significant differences in developing public glass art.

In Great Britain, policy enhances the economy, and the economy supports glass art education. This statement has been made regarding what we have studied about the developments of glass art education in Great Britain. The Percent-for-Art policy and the money that came from the European funding have improved glass art in public spaces. According to Cate Watkinson (Watkinson, Personal communication, 9 July, 2020), Great Britain's policy has increased the financial turnover due to EU membership. Then they have dedicated a division of this income to rejuvenate cities through public art projects, enhancing museums and art centers. For example, the National Glass Center in Sunderland, which was established in 1998 has great funding, to support glass art education (in Sunderland University) by providing facilities, workshop space, and contemporary galleries and exhibitions. In addition, Great Britain offers high-quality art education and glass art education in numerous universities, schools, studios, and workshops.

In Portugal, what we are witnessing is that the artists, glass art professors in art universities, researchers in a research center VICARTE -glass and ceramics for the arts, director and staff of Marinha Grande Glass Museum, and CENCAL are developing glass art and glass art education. The good point is their collaboration and contribution in overlapping projects that support each other. Therefore, we can expect to see more glass art in public spaces in the near future. However, the economic support from the government and the policies that the government defines could effectively influence the status of glass art and public glass art.

The reasons behind the lack of public Glass art in Iran are include several issues such as economic, political, educational, and the following issues:

- Government policies influenced the development of glass art in Iran. For example, according to Saeed Golkar, more than 90% of glass workshops in 2016 were closed due to the lack of attention and budget allocation to the growth and development of glass workshops by the government, which was a result of sanctions against Iran started from 2006 (Golkar, personal communication, 10 January, 2016). Another example is that artists and art students cannot buy glass art tools and equipment from foreign online stores because they cannot pay in the foreign banking system due to US sanctions against Iran.
- Because of the lack of interest and financial support from the government, and glass art expert's deficiency, Iran does not have a glass research center. At the same time, Iran is a rich country and has many natural resources, including oil and gas, which can be a good source for raising the necessary funds to establish a glass research center.
- Economic support for artists, glass art workshops, and glass art education is crucial in Iran. For instance, the glass workshops needed to receive a subsidy for gas from the government, but the lack of government support forced them to close glass workshops.
- The deficiency of specialized staff, skillful teachers, and professors to teach glass art techniques in Iran is an obstacle in educating the new skillful glass artists generation. It would be helpful for Iran to support some artists to go abroad and

educate and gain an acceptable level of knowledge and experience in glass art; then they will come back to Iran, teach glass art and pass on what they have learned to the glass art students.

- Lack of workshop facilities and equipment in Iran impedes glass art progress. It also depends on the policy and economic supports.

### **6.3 Reflections on The Improvement of Public Glass Art**

To sum up the findings of the research, it should be said that it is naive to expect public art to solve all cultural and social problems (Sharp et al, 2005). Meanwhile, the vital role of public art in the improvement of social, cultural, political, and economic issues is undeniable. Glass art with its impressive potential in the creation of public art projects needs to be supported and requires special attention to be improved. Academic art education and pedagogical programs are essential in the improvement of any kind of public art and especially in public glass art to promote appreciation of diversity and richness of cultures, developing an individual's personality, and strengthening social cohesion. Art education is a key to develop critical thinking and creativity to realize art trainee's full potential (Glenn, 2011). In this context, high-quality art education can help art trainees to develop a special and distinctive voice about ethics and science in relation to public understanding (Scott, 2008). Art education is vital for those who want to design and create public glass art projects because, through their artworks that surround and form our everyday life, they generate visual culture. According to Khan (2016), art education improves the understanding and sharing of culture. Those glass artists who are trained in educational programs will be better prepared to create artworks that show the identity of culture as an essential element of a public art piece. It also helps artists to learn the history of art, techniques of glass art, philosophy, and aesthetics.

Here, we summarize and suggest the main elements that can improve public glass art:

- Government has a critical role in policymaking for cultural-led programs to adopt and implement policies for supporting art, artists, and public art projects. For instance, governments and authorities should raise funds for executing public glass artworks. As much as we have a civic request for public art pieces, more artists will have commissions to create public glass art. Emerging of public glass art in societies also encourages people to enjoy art in their lives, so art could be more accessible for everybody. The policy Percent-for-art to assign one to two percent of the total cost of any newly constructed project to create common art projects would help to promote art and artistic project besides an increase in the requests for the art project and creates a turnover in the art market. Although this policy does not have a direct influence on the improvement of public glass art, it can increase the request for more public art projects and consequently public glass art projects.
- On the one hand, educational programs train glass artists to gain knowledge about different techniques, as well as glass safeguarding methods. On the other hand, educational programs provide an opportunity for the general public to experiment and know glass art which will help communities to accept and appreciate glass art in public spaces. Skillful glass art instructors and university professors could lead their students in the right way. Therefore, the main investment should be made to train specialized skillful instructors and professors.
- Organizing subsidiary programs and workshops for various publics is also profoundly efficient. These programs and workshops can enlighten the general public about how an artist creates and installs a body of glass artwork in a public space, as well as the installation cost. These workshops can also include experiencing and working with glass by students.
- Museums and glass art research centers have an effective role in introducing and promoting glass art in each country. Glass museums and Galleries in Portugal and Great Britain housing historical artifacts and displaying contemporary glass artworks. Therefore, we see people in these countries are more welcoming to

contemporary glass art in public spaces than a country like Iran, that its glass art museum just displays historical glass artifacts.

- Organizing glass art conferences and talks play a prominent role in bringing artists together to share their common discipline. That promotes dialogues between artists to exchange their ideas and new findings in the glass art technology and conservation with their peers.
- Another important suggestion is to have a research center with a well-built academic rationale and strong financial backing. For example, The National Glass Center in Sunderland, England, plays a crucial role in supporting glass art education in the north of the UK. VICARTE, the glass and ceramic research center in Lisbon, Portugal, also plays an important role in advancing the research and educational goals of glass art, while in Iran, we do not have any research center for glass art.
- Moreover, the availability, accessibility, high quality, and various glass art supplies in stores inspire artists to execute their ideas in a better way. For example, Portugal and Iran do not have good quality shops that sell specific glass art supplies (such as sheet glass, frits in different sizes, glass paints, fusing accessories), equipment (such as kilns), and tools (such as glass blowing tools, Lampwork Bead Supplies, cutting and grinding tools) for a more demanding/exigent customers. Lack of glass art supply stores forces glass artists in Portugal to buy their requirements online from Spain or Germany, while some of these sellers do not sell their products at retail. This increases the costs of glass art production (including shipping costs) and limits the choices for glass artists. To solve that, it could be helpful to have glass art supplies stores in the glass art museum or art universities. They can sell glass art supplies and tools or receive orders from glass artists.

#### **6.4 Direction for Future Work**

Although the objectives of this thesis were successfully achieved, there are still some subjects of importance to be studied in the future. This section is aimed at



discussing new possible routes of research arising from the work presented in the previous chapters, taking into consideration the current and future requirements to be fulfilled in order to develop glass art in public spaces.

In this thesis, the state of glass art in Great Britain was studied as a thriving place that has several successful executed public glass art projects, great glass artists, and high quality of glass art education. However, there are other countries such as the United States, Germany, and the Netherlands which have notable examples in the creation and execution of public glass art pieces. Therefore, there is potential for further research that studies public glass art and case studies in the aforementioned countries, especially in the United States. For example, the 'Studio glass movement' that emerged in the United States resulted in the development of glass art techniques and facilitated the creation of glass artworks (Corning Museum of Glass, 2011).

There is also considerable potential for further research that focuses on the utilization of new glass art technologies and creative ways of using existing techniques to be developed and tailored to fit the requirements in the creation of public glass art projects. This could be about employing eco-friendly materials in combination with glass.

Perhaps because of the constant speed of development in science and artistic achievements, we need more creative and extensive research to open up more windows into artists' eyes. As much as art researchers work hard, we can expect a better understanding of arts and subsequently finding approaches to develop it.



## Bibliography

- "A Brief History of Glassmaking". (n.d.). Retrieved from <http://www.bristol-glass.co.uk/history.html>
- "A fountain of glass". (2016, March 12). London Public Art. Retrieved from <https://www.ianvisits.co.uk/blog/2016/03/12/a-fountain-of-glass/>.
- "A Nau Catrineta in Infopédia". (n.d.). Porto: Porto Editora, 2003-2020. Retrieved from [https://www.infopedia.pt/\\$a-nau-catrineta](https://www.infopedia.pt/$a-nau-catrineta). Access date 5.5.2020.
- "Acid Etching". (n.d.). Derix Glasstudios. Retrieved from <https://www.derix.com/en/glass-etching/>. Access date 14.12.2019.
- "Afonso Lopes Vieira in Infopédia". (n.d.). Porto: Porto Editora, 2003-2020. Retrieved from [https://www.infopedia.pt/\\$afonso-lopes-vieira](https://www.infopedia.pt/$afonso-lopes-vieira). Access date 5.5.2020.
- "Americans for the art". (n.d.). Going Away, Coming Home. Retrieved from <https://www.americansforthearts.org/by-program/networks-and-councils/public-art-network/public-art-year-in-review-database/going-away-coming-home>. Access date: 7.8.2019
- "Anniversary of a very special project". (2018, April 10). Derix Glasstudios. Retrieved from <https://www.derix.com/en/allgemein-en/anniversary-of-a-very-special-project/>. Access date: 13.6.2019.
- "Clifford Rainey". (n.d.). Retrieved from <https://www.cliffordrainey.com>. Access date 14.12.2019.
- "Monument to the Discoveries". (n.d.). Padrão dos Descobrimentos. Retrieved from <https://padraodosdescobrimentos.pt/en/monument-to-the-discoveries/>. Access date 8.8.2020.
- "Sand casting". (n.d.). Corning Museum of glass. Retrieved from <https://www.cmog.org/glass-dictionary/sand-casting>. Access date 10.12.2019.
- "Sand casting". (n.d.). Corning Museum of glass. Retrieved from <https://www.cmog.org/glass-dictionary/sand-casting>. Access date 10.12.2019.
- "Sandblasting". (n.d.). Derix Glasstudio. Retrieved from <https://www.derix.com/en/glass-sandblasting/>. Access date 14.12.2019.
- "Spektrum Sparkassenakademie Stuttgart". (n.d.). CODAworx. Retrieved from <https://www.codaworx.com/project/sparkasse-bank-academy-of-state-of-baden>. Access date 14.12.2019.
- "What is fusing?" (n.d.). Retrieved from <https://www.bullseyeglass.com/what-is-fusing.html>. Access date 9.12.2019.

- “What is slumping?” (n.d.). Retrieved from <https://www.bullseyeglass.com/what-is-slumping.html> Access date 26.11.2019.
- Abreu, A. (2017, November 7). Personal communication with Alexandra Abreu [In-person interview].
- Acrylicize. (n.d.). Acrylicize webpage. Retrieved from <http://www.acrylicize.com>.
- Agnew, J. (2011). Space and place. *Handbook of geographical knowledge*, 2011, 316-331.
- Aguirre, P. (2010). Education with innovations: Beyond art-pedagogical projects. *Education*, 177, 189.
- Ahani, F. (2011). Natural light in traditional architecture of Iran: lessons to remember. *Light in Engineering, Architecture and the Environment*, 121, 25-36.
- Al-Kodmany, K. (2013). Placemaking in the High-Rise City: Architectural and urban design analyses. *International Journal of High-Rise Buildings*, 2(2), 153-169.
- Almeida, T. (2010). “Glass: art or craft? A perspective in the Portuguese panorama”, presented at the 2nd International Forum of Design as a Process, University of Aveiro, Aveiro 28-30 October 2010.
- Almeida, T. (2011). Glass as a fine art material: transparency, light, color, and expression. Doctoral dissertation, University of Aveiro.
- Almeida, T. (2012 a). Art and science: New approaches in the Making, Process, and Development of New Materials. *International Journal of Art in Society*.
- Almeida, T. (2012 b). “As faculdades do vidro: o vidro na faculdade” in Martins, C S; Terrasêca, M, Martins, V. (ed), *À procura de renovações de estratégias e de narrativas sobre a educação artística*, GESTO. pp135-140.
- Almeida, T. (2013 a). Glass seen through feminine eyes (O lado feminino do vidro). [Exhibition catalog]. Camara Municipal da Marinha Grande.
- Almeida, T. (2013 b) 12 Produção artística em vidro: Contextualização do paradigma contemporâneo em Portugal. *Diálogos com a arte*, 144.
- Almeida, T. (2016). Printing and engraving in alternative surfaces: glass and ceramic. Machado, Graciela (ed.). Pure Print Publication. Editor: Universidade do Porto. Reitoria I2ads /FBAUP. ISBN 978-989-746-100-2.
- Almeida, T. (2018 a). New cultural approaches to glass museums. *Reviews on Glass 6*. ICOM Glass. Retrieved from [https://issuu.com/icom-glass\\_reviewsonglass01/docs/icom\\_glass\\_6\\_web](https://issuu.com/icom-glass_reviewsonglass01/docs/icom_glass_6_web). Access date 7.7.2020.
- Almeida, T. (2018 b). *Specularis-looking through*. FBAUP/i2ads, Porto. ISBN 978-989-54111-4-6 (impresso) 978-989-54111-5-3 (eletrónico).
- Almeida, T. (2020 a, April 17). Personal communication with Teresa Almeida [Via Skyp].

- Almeida, T. (2020 b, September). Design Glass Objects: The Portuguese Panorama. In Arts (Vol. 9, No. 3, p. 79). Multidisciplinary Digital Publishing Institute.
- Amado, M. Lebovici, E. ZAYA. (2010). Joana Vasconcelos. No network, Berardo Collection Museum, Belém Cultural Center.
- Ambient Glow Technology. (n.d.). Retrieved from <https://ambientglowtechnology.com/collections/ultra-grade-glow-stone>. Access date 5.7. 2017.
- Ames, P. (2018, December 2). Portugal confronts its slave trade past. Politico. Retrieved from <https://www.politico.eu/article/portugal-slave-trade-confronts-its-past/>. Access date 7.8.2020.
- Anderson, j. (2015, September 4). 3D printer extrudes molten glass to produce objets d'art. Retrieved from <http://newatlas.com/3d-printer-glass-objects/39137/>
- Andrews, F. (2010, October 17). Edinburgh College of Art - Glass Students. Scotlands Glass. Retrieved from [http://www.scotlandsglass.co.uk/cms/index.php?option=com\\_content&view=article&id=155:eca-glass-students&catid=14:scottish-glass-organisations-a-education&Itemid=18](http://www.scotlandsglass.co.uk/cms/index.php?option=com_content&view=article&id=155:eca-glass-students&catid=14:scottish-glass-organisations-a-education&Itemid=18). Access date 28.11.2020.
- Archello. (n.d.). Angles of incidence. Retrieved from <https://archello.com/project/angles-of-incidence>. Access date 10.12.2019.
- Archyde. (2020, January 15). sculpture by Cabrita Reis, vandalized in Porto. Retrieved from <https://www.archyde.com/a-sculpture-by-cabrita-reis-vandalized-in-porto/>. Access date 8.8.2020.
- Arjmandi, H., Tahir, M. M., Shabankareh, H., Shabani, M. M., & Mazaheri, F. (2017). Psychological and spiritual effects of light and color from Iranian traditional houses on dwellers. e-Bangi, 8(1).
- Arnold, A. (2009). Susan Liebold: Bright Gloomy Sounds. Neues Glas, (4), 34.
- Art Alliance for Contemporary Glass. (n.d.). Artist of the month of December 2012, Vaclav Cigler. Retrieved from <https://contempglass.org/artists/entry/vaclav-cigler> Access date 14.11.2019.
- Arthur, R. (1994). Space and relativity in Newton and Leibniz. The British Journal for the Philosophy of Science, 45(1), 219-240.
- Associated Press. (2014, Jun 28). Game of Thrones has people flocking to Northern Ireland. The Journal. Retrieved from <https://www.thejournal.ie/game-of-thrones-northern-ireland-2-1532974-Jun2014/>. Access date 19.11.2019.
- Australian Service Nurses National. (n.d.). Retrieved from <http://monumentaaustralia.org.au/themes/conflict/multiple/display/90056-australian-service-nurses-national-memorial>. Access date 10.12.2019.



- Azarian Sadabad, P., Amirdastmalchi, M., & Haj Ostad Nourani, N. (2014). Light and color aesthetic in Sash windows (case study: Behnam building). *Scientific Journal of Review*, 3(7), 500-504.
- Balgavá, B., & Eliëns, T. M. (2005). *Thinking in glass: Václav Cígler and his school*.
- BBC News. (2005, March 8). Glass tower sculpture is unveiled. Retrieved from [http://news.bbc.co.uk/2/hi/uk\\_news/england/tyne/4328273.stm](http://news.bbc.co.uk/2/hi/uk_news/england/tyne/4328273.stm). Access date 11.2.2020.
- Becker, J. (2004). *Public art: An essential component of creating communities*. Washington, DC: Americans for the Arts.
- Beeldengeluid. (n.d.). Building. Retrieved from <https://www.beeldengeluid.nl/en/visit/whats-on/gebouw>. Access date 25.11.2019.
- Birmingham, D. (2018). *A concise history of Portugal*. Cambridge University Press.
- Blench, B. J. (1989). IMPASSIONED VISION—Helen Turner and the teaching of glass design. *The Journal of the Decorative Arts Society 1850-the Present*, (13), 39-42.
- Böer, K.W., (n.d.). Solar Cells. Retrieved from <http://www.chemistryexplained.com/Ru-Sp/Solar-Cells.html>
- Brandt, Asa. (2008). *Så doftar glas! Solna*. Eskilstuna.
- Bray, C. (2001). *Dictionary of glass: materials and techniques*. University of Pennsylvania Press.
- Briney, A. (2019, October 03). An Overview of Cultural Geography. Retrieved from <https://www.thoughtco.com/overview-of-cultural-geography-1434495>. Access date 15.11.2019.
- British Society of Master Glass Painters. (n.d.). Stained glass training. Retrieved from <https://www.bsmgp.org.uk/resources/stained-glass-training/> Access date 3.3.2020.
- Brooks, K. (n.d.). Kirsty Brooks. Retrieved from <https://www.axisweb.org/p/kirstybrooks/#info>. Access date 19.2.2020.
- Brown, P. (2005). *Creating places- the role of art in city development*. Curating the local. Edited and translated by Gabriela Vaz-Pinheiro. ArtInSite.
- Bryant, B. (2016). *The Importance of Fine Arts Education*. Katy ISD. Retrieved from <http://www.katyisd.org/dept/finearts/Pages/The-Importance-of-Fine-Arts-Education-.aspx>
- BSMGP. (n.d.). Historic glass collections & websites. British Society of Master Glass Painters. Retrieved from <https://www.bsmgp.org.uk/stained-glass/historical-stained-glass/historic-glass-collections-and-websites/>. Access date 19.2.2020.
- Budzyńska, A. (2016). Colour, form and light fun: artistic glass in architecture. *Czasopismo Techniczne*.

- Bullseye Studio. (n.d.). "Reason to Be" Jessica Jackson Hutchins. Retrieved from <https://studio.bullseyeglass.com/projects/reason-to-be/>. Access date: 6.8.2019.
- Cabral, A. (2013). Joana Vasconcelos e Rafael Bordalo Pinheiro: uma relação "à flor da pele". *Revista: Estúdio*, 4(7), 185-189.
- Cabral, C. (2020, February 26). Teresa Almeida did the personal communication with Conceição Cabral in Marinha Grande, Portugal [In-person interview].
- Carbone, A., & Sheard, J. (2002, June). Developing a model of student learning in a studio-based teaching environment. In *Informing Science & IT Education Conference*, Cork, Ireland.
- Carboni, S., & Sabah, N. S. A. A. (2001). *Glass from Islamic lands*. New York: Thames & Hudson.
- Carmona, M., Heath, T., Tiesdell, S., & Oc, T. (2010). *Public places, urban spaces: the dimensions of urban design*. Routledge.
- Carpenter, E. (n.d.). Ed Carpenter, Artist. Retrieved from <https://www.edcarpenter.net>
- Carradas, F. (2017, November 7). Personal communication with Fernando Carradas [In-person interview].
- Carvalho, C. (2014). *Travessias Crossings*. Núcleo de Arte Contemporâneo. Museo del Vidrio. Marinha Grande. Portugal.
- Casanovas, M. (2005). Public Art and its integration in the Urban Environment. *e- π ο λ ι σ ε- π ο λ ι σ*, 19.
- Cauquelin, A. (2005). Site, place and "Monde". Curating the local. Edited and translated by Gabriela Vaz-Pinheiro. *ArtInSite*.
- Cecot, D. (n.d.). Art for public. Is public art activating public spaces? Retrieved from [https://www.academia.edu/10036854/Art\\_for\\_public.\\_Is\\_public\\_art\\_activating\\_public\\_spaces](https://www.academia.edu/10036854/Art_for_public._Is_public_art_activating_public_spaces). Access date: 17.7.2019.
- Cespedes, M. A. (2016). Art With a Purpose. *Art and Literature Scientific and Analytical Journal TEXTS4*, 112.
- Chihuly, D. (2014, April 3). London Sees The sun. Retrieved from <https://www.chihuly.com/blog/london-sees-sun>.
- Chihuly, D. (n.d.). Dale Chihuly. <https://www.chihuly.com>.
- Chilvers, I. (Ed.). (2009). *The Oxford dictionary of art and artists*. Oxford University Press.
- Ching-ching, Y. (2008, August 4). Dome of Light focus of rights talks. Retrieved from <http://www.taipeitimes.com/News/taiwan/archives/2008/08/04/2003419373>. Access date:11.6.2019.

- Christensen, H. H., Johnson, D. R., & Brookes, M. H. (1992). *Vandalism: research, prevention, and social policy* (Vol. 293). US Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- Cigler, V. (n.d). Václav Cigler. Central European art database. Retrieved from <http://cead.space/index.php/Detail/people/id:14>. Access date 15.11.2019.
- Cigler, V., Motyčka, M., & Šindelová, J. (2009). *Václav Cigler-prostory, projekty*. Michal Motyčka.
- Clarke, B. (n.d.). Brian Clarke Studio. Retrieved from <http://www.brianclarke.co.uk>. Access date 14.2.2020.
- Clay, C. L. (2018). *Objectively art?: an examination of the critical reception of Dale Chihuly's work*. UMI thesis.
- Cockram, M., (2012, June 6). Art Watts. Retrieved from [http://www.architectureweek.com/2012/0606/environment\\_1-1.html](http://www.architectureweek.com/2012/0606/environment_1-1.html). Access date: 19.8.2019.
- Coimbra, A. (2012, April 26). Monumento homenageia em Fafe o Poder Local na altura em que é mais atacado e humilhado. <http://saladevisitasdominho.blogspot.com/2012/04/monumento-homenageia-em-fafe-o-poder.html>
- Corning Museum of Glass. (2011, October 5). The American Studio Glass Movement. Retrieved from <https://www.cmog.org/article/american-studio-glass-movement>. Access date 16.11.2019.
- Coronare Modestus Faust, (2011, June 12). Neve og Rose (Fist and Rose): The Controversial Sculpture By Ola Enstad. Retrieved from <https://spfaust.wordpress.com/2011/06/12/neve-og-rose-fist-and-rose-the-controversial-sculpture-by-ola-enstad/>. Access date: 5.8.2019
- Correiro, C. (2006). *Portugal's Golden Years: The Life and Times of Prince Henry "The Navigator"*. Dorrance Publishing Co., Inc.
- Cortes, M. A. M. (2013). *Cultural Heritage and Urban Regeneration: The Conflict Between Identity and Development Strategies in the City of Valparaiso* (Doctoral dissertation, University College London).
- Coutinho, I. (2016). *New insights into 17th and 18th century glass from Portugal: Study and Preservation*.
- Coutinho, I. (2017, October 11). Personal communication with Inês Coutinho [By Email].
- Cowan, D. (2016, May 24). Kirkstall Bridge Clock Tower – Making Light of Time. Retrieved from <https://pulsarlight.com/kirkstall-bridge-clock-tower-making-light-time/>. Access date 12.2.2020.

- Croft, J. (2019). *Uma Coisa / One Thing*. [Exhibition catalog]. Curated by Delfim Sardo. Galeria Municipal de Matosinhos, Portugal.
- Cruz, M. J. C. (2019). *Design urbano e o vandalismo no espaço público* (Doctoral dissertation).
- Cummings, K. (1997). *Techniques of kiln-formed glass*. University of Pennsylvania Press.
- Cummings, K. (2002). *A history of glassforming*. University of Pennsylvania Press.
- Cummings, K. (2009). *Contemporary kiln-formed glass: A world survey*. University of Pennsylvania Press.
- Custom planet. (n.d.). What is screen printing? A step-by-step guide. Retrieved from <https://www.customplanet.co.uk/what-is-screen-printing-step-by-step-i50>. Access date 20.11.2019.
- Cutler, V. (2012). *New technologies in glass*. A&C Black.
- Cutler, V. (2020, June 17). Personal communication with Vanessa Cutler [By Email].
- Cutler, V. (2020, June 25). Personal communication with Vanessa Cutler [Via Zoom application].
- Dafoe, T. (2019, July 2). 7 People Have Been Arrested for Vandalizing Anish Kapoor's Beloved 'Cloud Gate' Sculpture in Chicago. Artnet news. Retrieved from <https://news.artnet.com/art-world/cloud-gate-vandalism-arrest-1591105> Access date: 3.9.2019.
- Darts, D. (2006). *Art education for a change: Contemporary issues and the visual arts*.
- Davis Landscape Architecture, London. (2014). UK. Retrieved from <https://davisla.wordpress.com/2014/06/13/plantation-lane-london/>.
- De Roepstorff, B. (Ed.). (2000). *Nordic Glass 2000: Glass Without Boundaries:[a Traveling Exhibition in Glass Art, with Pieces from Denmark, Sweden, Norway, Iceland, Finland and the Baltics]*. Association Nordic Glass 2000.
- De Solà-Morales, M. (1992). *Public and collective space: The urbanisation of the private domain as a new challenge*. La Vanguardia, Barcelona.
- Del Vallès, C. (2018, January 24). Prehistoric Iranian glass under synchrotron light. Retrieved from <https://www.albasynchrotron.es/en/media/news/prehistoric-iranian-glass-under-synchrotron-light>. Access date 20. 7. 2020.
- Desai, D., & Darts, D. (2016). Interrupting Everyday Life: Public Interventionist Art as Critical Public Pedagogy. *International Journal of Art & Design Education*, 35(2), 183-195.
- Diane Farris Gallery. (n.d.). *Gardens of Glass: Chihuly at Kew*. Retrieved from <http://www.dianefarrisgallery.com/artist/chihuly/kew/kew.htm>. Retrieved from 3.3.2020.

- Digital Harbor Museum. (n.d.). Das Belas-Artes ao Cubo da Ribeira. Roteiro da Arte de José Rodrigues em Espaços Públicos na cidade do Porto. Retrieved from <https://museudigital.pt/pt/roteiros/16>. Access date 24.10.2019.
- Dip-Tech Digital Printing Technologies Ltd. (2015). <http://www.dip-tech.com/printed-glass-projects/anzac-memorial-for-ocean-beach-rsl>. Access date 14.10.2016.
- Dissanayake, A. (2013). Place with (out) Space: The iTale of Brussels and Colombo.
- Donlin, M., (n.d.). Raleigh Durham Airport. Retrieved from <https://martindonlin.com/projects/raleigh-durham-airport-terminal-1/>.
- Doolan, S. (2012, September). The development of strategies for working with three-dimensional glass forms using two-dimensional waterjet cutting. In 21st International Conference on Water Jetting (pp. 143-157). BHR Group.
- Doss, E. (2016). The Process Frame: Vandalism, Removal, Re-Siting, Destruction. A Companion to Public Art, 403-421.
- Dowlatshahi, K. (n.d.). Public Art / 'Exeter Traceries' – Exeter. Retrieved from <https://www.katayoundowlatshahi.com/Public-Art-Exeter-Traceries-Exeter>. Access date 10.2.2020.
- Drummond, L. B. (2000). Street scenes: practices of public and private space in urban Vietnam. *Urban studies*, 37(12), 2377-2391.
- Eliëns, T. M., & Prisse, C. (Eds.). (2009). *Glas/s: Gerrit Rietveld Academie Amsterdam 1969-2009*. Waanders Pub.
- Esche, C., & Bradley, W. (Eds.). (2007). *Art and social change: A critical reader*. Tate Publishing.
- Evison, V. (2000). Glass vessels in England, AD 400-1100. *OCCASIONAL PAPER-BRITISH MUSEUM*, 47-104.
- Faghihi, P., Almeida, T., & Quintas, F. (2015, December). Public Glass Art: Exploring the impacts of glass art in public spaces. In: *Anais do Congresso Mundial de Comunicação e Artes-WCCA* (pp. 21-24).
- Faghihi, P., Almeida, T., & Quintas, F. (2016). Preventing Vandalism in Public Glass Art. In *Congresso Internacional em Artes, Novas Tecnologias e Comunicações*, 16. CIANTEC.
- Faghihi, P., Quintas, F., & Almeida, T. (2017 a). The Impact of the Evolution of Modern Technology on Public Glass Art. *Public art in the digital creativity era*. Porto, Portugal.
- Faghihi, P., Quintas, F., & Almeida, T. (2017 b). Architectural glass in the 18th to 20th centuries in Iran. *Glass science in art conservation 2017*, 43-45.
- Fakhar, S. E., & Shahab, P. (2018) Investigating the Relationship between Responsive Environment and Appearance of Public Art Case Study: The St. Petersburg Palace Square and Moscow Red Square. *International Journal of Sciences: Basic and Applied Research (IJSBAR) Volume 42, No 2*, pp 57-69



- Farago, J. (2014). Degenerate Art: The Attack on Modern Art in Nazi Germany, 1937 review—What Hitler Dismissed as 'Filth,'. *The Guardian*, 13.
- Fisher, D. H. (1996). Public art and public space. *Soundings: An Interdisciplinary Journal*, 79(1/2), 41-57.
- Fleming, R. L. (2007). *The art of placemaking: Interpreting community through public art and urban design*. London: Merrell.
- Fokai, Sh. (1993). *Iranian Glass*. Cultural Heritage Administration of Tehran.
- FORM, A., FROM, D., & CONSUMER, H. (1993). *HIGH TECH ART-CHAMELEON GLASS*.
- Foster, N. (2000). *Rebuilding the Reichstag*. Overlook Pr.
- Frade, J. (2017, November 7). Personal communication with José Frade [In-person interview].
- Francis, J., Giles-Corti, B., Wood, L., & Knuiiman, M. (2012). Creating sense of community: The role of public space. *Journal of environmental psychology*, 32(4), 401-409.
- Freedman, K., & Stuhr, P. (2004). Curriculum change for the 21st century: Visual culture in art education. *Handbook of research and policy in art education*, 815-828.
- Frudakis, Z. (n.d.). Zenos Frudakis - Public Monuments and Portrait Sculptures. Retrieved from <http://www.zenosfrudakis.com/freedom-sculpture>. Access date 1
- Fuller, K. B. (2006). *Contemporary stained glass artists: a selection of artists worldwide*. A. & C. Black.
- Gateshead council. (n.d.). Opening Line. Retrieved from <https://www.gateshead.gov.uk/article/4553/Opening-Line->. Access date 11.2.2020.
- Gever, E. (2015). The Interrelationship and Convergence of Technology and Art. *IEEE Potentials*, 34(6), 8-12.
- Glass sculpture foundation. (n.d.). Artist Zora Palova. Retrieved from <http://www.sculpture.org.uk/artist/zora-palova>. Access date 20.5.2020.
- Glenn, B. (2011). *The Impact of Arts Education in the Developing World: A Case Study of a NGO in Kenya* (Doctoral dissertation, Institute of Education University of London).
- Going Away, Coming Home. (n.d.). Going Away, Coming Home - Hung Liu. Retrieved from <https://www.americansforthearts.org/by-program/networks-and-councils/public-art-network/public-art-year-in-review-database/going-away-coming-home>. Access date: 7.8.2019.
- Golkar, S. (2016, January 10). Personal communication with Saeed Golkar. Tehran, Iran [In-person interview].

- Gourlay, C. & Ruiz, C. (2009, October 25). Look out, Paris, Boris plans a 'Piffle Tower'. The Times. Retrieved from <https://www.thetimes.co.uk/article/look-out-paris-boris-plans-a-piffle-tower-g00kdxnfjdd#top> Access date: 20.7.2019.
- Graafland, A., Kavanaugh, L. J., & Baird, G. (2006). *Crossover: architecture, urbanism, technology* (Vol. 1). 010 Publishers.
- Gregory, D., Johnston, R., Pratt, G., Watts, M., & Whatmore, S. (Eds.). (2011). *The dictionary of human geography*. John Wiley & Sons.
- Griffiths, M. (2016). 'Imagine if our cities talked to us': Questions about the making of 'responsive' places and urban publics. University of Adelaide Press. *Making Publics, Making Places, 2016 / Griffiths, M., Barbour, K. (ed./s), Ch.3, pp.27-48.*
- Guetzkow, J. (2002). How the arts impact communities. *Centre for Arts and Cultural Policy Studies*, 7-8.
- Guzeva, A. (2019). 10 most beautiful mosaics of the Moscow Metro (PHOTOS). *Russia Beyond*. Retrieved from <https://www.rbth.com/travel/331280-mosaics-moscow-metro>. Access date 8.4.2021.
- Hall, T., & Robertson, I. (2001). Public art and urban regeneration: advocacy, claims and critical debates.
- Hamilton, J., Forsyth, L., & De longh, D. (2001). Public art: A local authority perspective. *Journal of Urban Design*, 6(3), 283-296.
- Hanachi, P. (2015). The Magic of Light in traditional Iranian architecture (evaluation methods taking advantage of natural light in the four main climate of Iran). *The light in Iran's Art, architecture and Urbanism conference*. 39-53.
- Hanley, P. A., & Plesscher, R. J. (1988). U.S. Patent No. 4,791,010. Washington, DC: U.S. Patent and Trademark Office.
- Hart, K. (2017, December 11). Personal communication with Keith J. Hart, Vice President Sales of AGT™ company [By Email].
- Heni Gallery. (n.d.). Brian Clarke 'Summer Solstice Screens'. Retrieved from [http://www.brianclarke.co.uk/sites/default/files/exhibition/attached-files/FINAL%20Clarke%20release%20for%20approval\\_Final.pdf](http://www.brianclarke.co.uk/sites/default/files/exhibition/attached-files/FINAL%20Clarke%20release%20for%20approval_Final.pdf). Access date 14.2.2020.
- Herrmann, G., & Curtis, V. S. (2002). Sasanian rock reliefs. *Encyclopaedia Iranica*.
- Hess, C., & Wight, K. (2005). *Looking at glass: a guide to terms, styles, and techniques*. Getty Publications
- Hilsbecher, K. (2017). *DNA Signature*. Edition Braus Berlin GmbH.
- Hiscott, A. (n.d.). Amber Hiscott. Retrieved from [www.amberhiscott.com](http://www.amberhiscott.com).

- Horsfield, J. (2015, October). Stained glass in the UK- The poor man's Bible. Publisher: Open Faith. Retrieved from [https://www.researchgate.net/publication/314095616\\_Stained\\_glass\\_in\\_the\\_UK\\_Poor\\_mans\\_bible](https://www.researchgate.net/publication/314095616_Stained_glass_in_the_UK_Poor_mans_bible). Access date 20.2.2020.
- Hosseini, H. (2016, January 17). Personal communication with Hayas Hosseini [In-person interview].
- Hosseini, H. (2018, September 12). Personal communication with Hayas Hosseini [In-person interview].
- Hu, J., Funk, M., Zhang, Y., & Wang, F. (2014, October). Designing interactive public art installations: new material therefore new challenges. In International Conference on Entertainment Computing (pp. 199-206). Springer, Berlin, Heidelberg.
- Inamura, C., Stern, M., Lizardo, D., Houk, P., & Oxman, N. (2018). Additive manufacturing of transparent glass structures. *3D Printing and Additive Manufacturing*, 5(4), 269-283.
- Iranian Students' News Agency. (2015. January 29). Photo story; destroyed sculptures. Retrieved from <https://www.isna.ir/news/93111910663/>. Access date: 5.9.2019.
- Irish Central Staff. (2019, April 17). Stunning Game of Thrones stained glass windows unveiled for final season. Retrieved from <https://www.irishcentral.com/travel/game-of-thrones-stained-glass-windows>. Access date: 6.6.2019.
- Jacquar, M. (n.d.). Max Jacquard. Retrieved from <http://maxjacquard.com/portfolio-item/patchwork-man/>. Access date: 17.5.2019.
- Javani, A., Javani, Z., & Moshkforoush, M. R. (2010). Studying Relationship between Application of Light and Iranian Pattern of Thought (the Iranian ideology).
- Jawawa. (2004, September 2). Masuda Hiromi blows a new class of glass. Okusi Associates, Indonesian Corporate Services. Retrieved from <https://jawawa.id/newsitem/masuda-hiromi-blows-a-new-class-of-glass-1447893297>. Access date 6.12.2019.
- Jones, G. (n.d.). Graham Jones. Retrieved from [www.grahamjones.org.uk](http://www.grahamjones.org.uk).
- Kammen, M. (2006). *Visual Shock*. United States: First Vintage Books Edition.
- Kapoor, A. (2018, March 12). Open letter on the NRA's unauthorized use of Cloud Gate. Retrieved from <http://anishkapoor.com/5104/letter-to-the-nra>. Access date: 3.9.2019.
- Kaprov, S. (2018, August 8). Personal communication with Susan Kaprov [By email].
- Kaprov, S. (n.d.). Susan Kaprove, Artist. Retrieved from <http://www.kaprov.com/>.
- Kastner, J. (2009). Out of Tiffany's Shadow, a Woman of Light. *New York Times*, 11-16.
- Kaushik. (n.d.). Art and Decor of Moscow Metro Stations. *Amusing Planet*. Retrieved from <https://www.amusingplanet.com/2013/05/art-and-decor-of-moscow-metro-stations.html> Access date 17.10.2019.

- Keating, S. J., Gariboldi, M. I., Patrick, W. G., Sharma, S., Kong, D. S., & Oxman, N. (2016). 3D printed multimaterial microfluidic valve. *PloS one*, 11(8), e0160624.
- Kelly, J. (2020, Jun 23). Personal communication with Jessamy Kelly [Via Zoom application].
- Khan, D. M. H., & Ali, S. L. (2016). The importance of Fine Arts Education-An overview. *Journals of Humanities and Social Science*, 4(10), 67-70.
- Khanpour, A. (2020, November 20). Personal communication with Arezoo Khanpour [Via Zoom application].
- Khanpour, A., Sohrabi Nasirabadi, M., & Mohammadzadeh, M. (2020). The study of Artist's Role in Traditional Iranian Glass Factories by the Approach of Giddens' Structuration Theory. *The Monthly Scientific Journal of Bagh-E Nazar*, 17(85), 57-66.
- Khatib, J. (Ed.). (2016). *Sustainability of construction materials*. Woodhead Publishing.
- Kiefer, K. A. (2014). *Public Art: Context & Process in San Luis Obispo, CA*.
- Knapp, S. (1998). *The Art of Glass*. Rockport Publishers.
- Kosta Boda Art Gallery. (n.d.). Bertil Vallien. Retrieved from <http://www.kostaboda-artgallery.com/artist/bertil-vallien>. Access date 12.12.2019.
- Krauss, R. (1979). Sculpture in the expanded field. *October*, 8, 31-44.
- Kroger, J. (2012, February 9). Glass. *Encyclopedia Iranica*. Retrieved from <http://www.iranicaonline.org/articles/glass>.
- KTMO5678. (2011, November 28). An architect and painter collaborate on a glass public art project in Oklahoma City. Retrieved from <https://glassquarterly.wordpress.com/2011/11/28/an-architect-and-painter-collaborate-on-a-glass-public-art-project-in-oklahoma-city/>. Access date 20.7.2020.
- Küçükbiçmen, E. (2017). Reflection and illusion in glass art; mastering artist Jin Hongo and his work. *Proceedings of the 5th GLASSAC International Conference. Environment*, 2,61-62.
- Kuspit, D. B. (1997). *Chihuly*. HN Abrams.
- Kwon, M. (2004). *One place after another: Site-specific art and locational identity*. MIT press.
- Laia, C. A. T. and Ruivo, A. (2019) Photoluminescent Glasses and Their Applications. *Fluorescence in Industry*, 365–88. Springer, Berlin, Heidelberg.
- Landi, P. J. (2012). *Public art-purpose and benefits: Exploring strategy in the New England city of Pittsfield, MA*.
- Lane, D. (n.d.). [www.dannylane.co.uk](http://www.dannylane.co.uk). Access date 12.2.2020.
- Langhamer, A. (2006). *Glass and Light: 150 Years of the Secondary School of Glassmaking in Kamenický Senov; 1856-2006*; published to Accompany the Exhibitions Held in the

Museum of Decorative Arts in Prague from 15 June to 17 September 2006 and the Design Centre of the Czech Republic in Prague from 15 June to 16 August 2006]. Museum of Decorative Arts in Prague.

Langley, W. (n.d.). Warren Langley. Retrieved from <https://www.warrenlangley.com.au/>.

Layton, P. (1996). Glass art. A&C Black.

Lee, D. (2007, September 23). Bilbao, 10 years later. The New York Times. Retrieved from <https://www.nytimes.com/2007/09/23/travel/23bilbao.html?ei=5087&em&en=898bb5be11939f56&ex=1190606400>. Access date: 3.9.2019.

Levin, C. (n.d.). Caroline Levine. Retrieved from: <https://english.cornell.edu/caroline-levine>.

Levine, C. (2002). The paradox of public art: Democratic space, the avant-garde, and Richard Serra's "Tilted Arc". *Philosophy & Geography*, 5(1), 51-68.

Liu, H. (n.d.). Hung Liu. Retrieved from <http://www.hungliu.com/going-away-coming-home-2006.html>.

Llewellyn, N. (Ed.). (2015). *The London Art Schools: Reforming the Art World: 1960 to Now*. Tate Publishing.

Lopes, M. (2014, October 17, 2004). Conceição Cabral: "It took a lot of courage to make this piece" (Conceição Cabral: "Foi preciso muita coragem para fazer esta peça"). *Tinta Fresca Jornal de Arte, Culture & Cidadancia*. Retrieved from <http://www.tintafresca.net/News/newsdetail.aspx?news=8b960244-5a65-46a8-8fb5-478c67dc73c3&edition=48>. Access date 17.8.2020.

Luque, A., & Hegedus, S. (Eds.). (2011). *Handbook of photovoltaic science and engineering*. John Wiley & Sons.

Lydiate, H. (n.d.), Percentage for Art. *Artlaw*. Retrieved from <https://www.artquest.org.uk/artlaw-article/percentage-for-art-2/> Access date: 6.9.2019

Lynn, M. D. (2004). *American Studio Glass, 1960-1990*. Hudson Hills.

Machado, C., Machado, A., Palomar, T., & Vilarigues, M. (2019). Grisaille in historical written sources. *J Glass Stud*, 61, 71-86.

Maderuelo, J. (1990). *El espacio raptado. Interferencias entre*.

Maia, H., & Araújo, C. B. (2014). Space and Place in Urban Culture. *Keep it Simple, Make it Fast! An Approach to Underground Music Scenes*, 7, 563-567.

Mark, J. (2014, November 25). Vandals. *Ancient History Encyclopedia*. Retrieved from <https://www.ancient.eu/Vandals/>. Access date 2.6.2019.

Martin, J. (2012, April 26). *MONUMENTO AO AUTARCA FOI INAUGURADO*. Retrieved from <http://falafcult.blogspot.com/2012/04/monumento-ao-autarca-foi-inaugurado.html>.



- Martinsone. (2000). "Glass art in Latvia," IN: Nordic Glass 2000: Glass without Boundaries. Denmark: Association Nordic Glass 2000. pp. 196–216.
- Matosinhos City Council. (n.d.). Work "Uncertain Measure" - Sculptures by José Pedro Croft. Retrieved from [https://www.matosinhoswbf.pt/pages/326?geo\\_article\\_id=570](https://www.matosinhoswbf.pt/pages/326?geo_article_id=570) . Access date 11.4.2020.
- Meisner, M. (2008). Archaeological history of Roman glass (Doctoral dissertation).
- Mendes, J. M. A. (2002). História do Vidro e do Cristal em Portugal. Edições Inapa.
- Miles, M. (2005). Art, space and the city. Routledge.
- Mitchell, D. (1995). The end of public space? People's Park, definitions of the public, and democracy. *Annals of the association of American geographers*, 85(1), 108-133.
- Moore, A. (1997). Architectural glass art: form and technique in contemporary glass. Mitchell Beazley.
- Moore, A. (2006). Colours of architecture: coloured glass in contemporary buildings. Sterling Publishing Company, Inc.
- Moore, A. (2016, August 12). Personal communication with Andrew moor [by email].
- Moore, A. (2017, July 25). Personal communication with Andrew moor, London, England [In-person interview].
- Moore, A. (n.d.). Andrew Moore Association. Retrieved from <http://andrewmoor.co.uk>
- Moore, A., 2006. Colours of architecture: coloured glass in contemporary buildings. Sterling Publishing Company, Inc.
- Morris, E. (1988). Stained and decorative glass. Simon & Schuster.
- Moser, G. (1992). What is vandalism? Towards a psycho-social definition and its implications. USDA Forest Service general technical report PNW-GTR-Pacific Northwest Research Station.
- Nascimento, M. L. F. (2014). Brief history of the flat glass patent—Sixty years of the float process. *World Patent Information*, 38, 50-56.
- National Geography. (n.d.). Retrieved from <https://www.nationalgeographic.org/encyclopedia/urban-area/>. Access date 1.9.2019.
- National Glass Centre. (n.d.). Sunderland National Glass Centre official website. Retrieved from <https://sunderlandculture.org.uk/>. Access date 20.10.2020.
- Neiswander, J., & Swash, C. (2005). *The Intelligent Layman's Stained & Art Glass: A Unique History of Glass Design and Making*. Intelligent Layman.
- Nery, E. (2007). *Apreciação estética do azulejo*. Inapa.

- Nexus. (n.d.). 'Opening Line' by Danny Lane. Retrieved from <https://www.nexus.org.uk/art-transport/commissions/opening-line-danny-lane>. Access date 11.2.2020.
- Nobre, C. & Magalhaes, F. (2010). Roteiro-museológico: Casa-Museu Afonso Lopes Vieira\_ Lugar Literário. Onde a terra se acaba e o mar começa. Camara Municipal da Marinha Grande.
- Oldknow, Tina. (2003). "Dale Chihuly: A Selective Biography," *Glass Art Society Journal*, 12-15.
- Opie, J. H. (2001). *Chihuly at the V&A*. V&A Publications.
- Overview of waterjets. (n.d.). Retrieved from <http://waterjets.org/archive/about-waterjets/overview-of-waterjets/>.
- Page, M. E., & Sonnenburg, P. M. (2003). *Colonialism: an international, social, cultural, and political encyclopedia* (Vol. 1). ABC-CLIO.
- Palz, W. (Ed.). (2013). *Solar power for the world: what you wanted to know about photovoltaics* (Vol. 4). CRC press.
- Pattern glass school. (n.d.). Flashed! Stained! Cased! What's the Difference? Retrieved from <https://www.patternglass.com/FlashCaseStain/FlashCaseStain.htm>. Access date 12.11.2019.
- Pepi, R. M., BUCHNER, L. N., & Gembinski, C. (2014). Conservation of Dalle de Verre at the New York hall of science. *APT Bulletin*, 45(4), 3-12.
- Petrie, K. (2006). *Glass and print*. University of Pennsylvania Press.
- Petrie, K. (2011). Creative glass research—case studies from art and design. *Glass Technology-European Journal of Glass Science and Technology Part A*, 52(1), 1-10.
- Petrie, K. (2019, March). On Glass, in *Glass, of Glass: Some Developments in the Combination of Glass and Printmaking*. In *Arts* (Vol. 8, No. 1, p. 21). Multidisciplinary Digital Publishing Institute.
- Petrie, K. (2020, July 20). Personal communication with Kevin Petrie [By Email].
- Petrie, K. (n.d.). Prof Kevin Petrie. University of Sunderland. Retrieved from <https://web.archive.org/web/20121002062119/http://www.sunderland.ac.uk/faculties/adm/research/artanddesign/researchstaff/profkevinpetrie/>.
- Pfaender, H. G. (Ed.). (2012). *Schott guide to glass*. Springer Science & Business Media.
- Pilkington, A. (n.d.). The Float Process. Retrieved from <https://www.pilkington.com/en/global/about/education/the-float-process/the-float-process>. Access date 22.8.2020.
- Pinheiro, D. (2020, June 25). Personal communication with Daniela Pinheiro [By Email].

- Price, J. (1998). The social context of glass production in Roman Britain. *The Prehistory and History of Glassmaking Technology*, 331-48.
- Princeton University Art Museum. (n.d.). (Any) Body ODDLY Propped, 2015. Retrieved from <https://artmuseum.princeton.edu/campus-art/objects/112011?lat=40.3476&lon=-74.6576>.
- Proctorstudios. (n.d.). Retrieved from <https://www.proctorstudios.com/public-art>. Access date 12.12.2019.
- Pulkkinen, M., & Hannus, H. (2005). The Handbook of the Percent for Art Principle in Finland For Commissioners. Retrieved from [https://prosenttiperiaate.fi/wp-content/uploads/The\\_Handbook\\_of\\_the\\_Percent\\_for\\_Art\\_Principle\\_in\\_Finland\\_For\\_Commissioners.pdf](https://prosenttiperiaate.fi/wp-content/uploads/The_Handbook_of_the_Percent_for_Art_Principle_in_Finland_For_Commissioners.pdf). Access date: 7.8.2019.
- Quagliata, N. (2014). Wind, fire, and time – the dome of light. Retrieved from <http://www.narcissusquagliata.com/index.php/artworks/wind-fire-and-time-the-dome-of-light>. Access date: 11.6.2019.
- Quintas, F. (2020, November 3). Personal communication with Fernando Quintas [Via Zoom application].
- Quintas, F. M. B. (2015). Vitral: contemporaneidade e sedução do poder. Phd Thesis. Faculdade de Belas-Artes da Universidade de Lisboa.
- Quora. (n.d.). What is intermediate space in architecture? Retrieved from <https://www.quora.com/What-is-intermediate-space-in-architecture>. Access date: 12.9.2019.
- Raimanová, I. (2018, October 3). Jan Ambrůz, Peephole (for J. K.), installation for the Granary. Agosto Foundation. Retrieved from <https://www.agosto-foundation.org/node/339>.
- Raw. (2014, December 16). RAW turns downtown Montreal into an interactive kaleidoscope. Retrieved from <https://www.contemporist.com/raw-turns-downtown-montreal-into-an-interactive-kaleidoscope/>. Access date 7.2.2017.
- Redol, P. (2003). O Mosteiro da Batalha eo Vitral em Portugal nos Séculos XV e XVI. Câmara municipal.
- Regatão, J. P. (2007). Arte Pública e os novos desafios das intervenções no espaço público. Lisboa: books on Demand, Quimera Editores, Lda.
- Regent College. (n.d.). Art and architecture. Retrieved from <https://www.regent-college.edu/our-campus/art-and-architecture>.
- Reid, C. (n.d.). Commissions. Retrieved from <https://www.colinreidglass.co.uk/commissions>.
- Ricke, H. (1990). New glass in Europe. *New Glass*, 4, 87.
- Ritter, A. (2006). Smart materials in architecture, interior architecture and design. Walter de Gruyter.

- Rocha, A. M. Machado, G. Almeida, T. Laia, C. A. T. Ruivo, A. (2020). Light-Emitting Prints on Glass. *Printmaking Journal*.
- Roos, H. E. (1992). Vandalism as a Symbolic Act in "Free Zones." *Vandalism: Research, Prevention and Social Policy*, 71.
- Roots, G. (2002). *Designing the world's best public art*. Images Publishing.
- Rosa, T. (2020, April 7). Personal communication with Tania Rosa [By Email].
- Saake, A. (2009, October 12). Difference between sculpture and installation art. Excavating Ibes. *Submerge Magazine*. Retrieved from <http://submergemag.com/art/excavating-ibes/>
- Sabo, R., & Falcato, J. N. (1998). *Azulejos arte e história: azulejaria de palácios, jardins e igrejas em Lisboa e arredores*.
- Salameh, R. (2014, January 29). Exeter's Eclectic Charms. Retrieved from <https://independenthostels.co.uk/exeters-eclectic-charms/>. Access date 10.2.2020.
- Saltzman, T. (2016, July 8). Glass sculptor dazzles at the ROM. *CJN*. Retrieved from <https://www.cjnews.com/culture/entertainment/dale-chihuly-dazzles-rom>. Access date 29.9.2020.
- Sarmiento, J. (2011). *Graphic Glass: Development of creative approaches to expressions of ethnicity* (Doctoral dissertation, University of Sunderland).
- Sarmiento, J. (2020, June 22) Personal communication with Jeffrey Sarmiento. [Via Zoom application].
- Schacter, R. (2013). *The world atlas of street art and graffiti*. Yale University Press.
- Schantz Galleries. (2019, Oct 4). BERTIL VALLIEN journey of the soul. Schantz Galleries Contemporary Glass. Retrieved from [https://issuu.com/schantzgalleries\\_issuu/docs/vallien2019journey\\_issuu](https://issuu.com/schantzgalleries_issuu/docs/vallien2019journey_issuu). Access date 12.12.2019.
- Scheerlinck, K. W. (2012). *Depth Configurations. Proximity, Permeability and Territorial Boundaries in Urban Projects*.
- Scott, J. (2008). AFFERENCE AND EFFERENCE: ENCOURAGING SOCIAL IMPACT THROUGH ART AND SCIENCE EDUCATION. *Educating Artists for the Future: Learning at the Intersections of Art*, 127.
- Selwood, S. (1995). *The benefits of public art: The polemics of permanent art in public places* (Vol. 770). London: Policy Studies Institute.
- Shabani, S. (2017). *Contemporary Iranian women artists: a virtual exhibition and catalog* (Doctoral dissertation, Rutgers University-Camden Graduate School).

- Shafipour, A. (2006). Orsi in Iranian traditional architecture. *Art and architecture magazine*, N 68. 164-183.
- Shahinpoor, M. (2020). Review of piezoelectric materials. *Fundamentals of Smart Materials*, 13.
- Sharp, J., Pollock, V., & Paddison, R. (2005). Just art for a just city: Public art and social inclusion in urban regeneration. *Urban Studies*, 42(5-6), 1001-1023.
- Sheng, S. (n.d.-a). Shan Shan Sheng. <http://www.shanshansheng.com>
- Sheng, S. (n.d.-b). Blooming. Retrieved from <https://www.codaworx.com/project/blooming-city-of-shenzhen-china>.
- Sieber, R. T. (2001). Remembering Vasco da Gama: contested histories and the cultural politics of contemporary nation-building in Lisbon, Portugal. *Identities Global Studies in Culture and Power*, 8(4), 549-581.
- Sierzputowski, K., (2018, December 5). Thousands of Shards of Glass Imitate Blurred Motion in a Towering Public Sculpture by Costas Varotsos. Retrieved from <https://www.thisiscoossal.com/2018/12/dromeas-by-costas-varotsos/>
- Silva, J. (2016, September 14). Personal communication with João Silva [By email].
- Silva, J. (2017, May 24). Personal communication with Joana Silva. Portugal [In-person interview].
- Silva, J. (2018, March 8). Personal communication with Joana Silva [By Email].
- Silvério, J. (2013). José Pedro Croft. Calouste Gulbenkian Museum. Retrieved from <https://gulbenkian.pt/museu/en/artist/jose-pedro-croft-2/>. Access date 1.11. 2020.
- Sleeswyk, A. (1998). Carvel-planking and carvel ships in the North of Europe. *Archaeonautica*, 14(1), 223-228.
- Smith Davidson Gallery, (n.d.). Mauro Bonaventura. Retrieved from <http://www.smith-davidson.com/artists/mauro-bonaventura>. Access date 6.12.2019.
- Smyth, H. (2005). *Marketing the city: The role of flagship developments in urban regeneration*. Taylor & Francis.
- Soares, S. (n.d.). Bee's. Susana Soares. Retrieved from <http://www.susanasoares.com/index.php?id=52>. Access date 28.7.2020.
- Stained Glass in Wales. (n.d). Amber Hiscott, 2011-2020, University of Wales. Retrieved from <http://stainedglass.llgc.org.uk/person/37>. Access date 16.2.2020.
- Swansea College of Art. (n.d.). Glass Facilities. Retrieved from <https://www.uwtsd.ac.uk/art-design/glass/glass-facilities/>. Access date 20.11.2020.

- The kings fortune. (n.d.). Labino Glass 1976 Red Iridized Pinched Art Glass Vase. Retrieved from <https://thekingsfortune.com/labino-glass-1976-red-iridized-pinched-art-glass-vase>. Access date 2.10.2020.
- The Magician. (n.d.). Retrieved from <http://www.israelpublicart.com/public-art-catalog/the-magician>.
- The Washington Glass School. (2019, October 10). Peppermill Community Center Public Art. Retrieved from <http://washingtonglassschool.com/peppermill-community-center-public-art>. Access date 9.12.2019.
- Thompson, L. (2017, July 28). Personal communication with Louis Thompson. Peter Layton London Glassblowing studio gallery [In-person interview].
- Thompson, L. (n.d.). Louis Thompson. Retrieved from <https://www.louisthompson.com/salisbury-cathedral>.
- Torisson, F. (2010, May 18). Tag Archives: Semi-private space. WSUS Blog. Retrieved from <https://waua.wordpress.com/tag/semi-private-space/>. Access date 9.6.2020.
- Tower of David - The Museum of the History of Jerusalem. (n.d.). Jerusalem 2000, Summer 1999, Dale Chihuly. Retrieved from <https://www.tod.org.il/en/exhibition/jerusalem-2000/> Access date 28.11.2019.
- Tuan, Y. F. S. (2005). *Space and Place: The Perspective of Experience*. 1977. Minneapolis: University of Minnesota Press. (Original work published in 1977).
- Turner-Bishop, A. (2018, April 21). Light, More Light. From the archive of the modernist magazine issue 2. Retrieved from <https://www.the-modernist.org/news/2018/4/21/light-more-light>. Access date 12.8. 2020.
- U.S. News Staff. (2019, 18 December). 10 Countries That Take the Most Immigrants. U.S.News. Retrieved from <https://www.usnews.com/news/best-countries/slideshows/10-countries-that-take-the-most-immigrants>. Access date 13.6.2020.
- UNESCO, G. (2015). *Education for all 2000–2015: Achievements and challenges*. EFA Global Monitoring Report, 500. Retrieved from <http://unesdoc.unesco.org/images/0023/002322/232205e.pdf>.
- UNESCO. (2017). *Education Transforms Lives*. Paris, UNESCO. pp. 6, 8–9. Retrieved from <http://unesdoc.unesco.org/images/0024/002472/247234e.pdf>.
- United Nations. (2015). “Transforming our world: the 2030 Agenda for Sustainable Development”. United Nations – Sustainable Development knowledge platform. Retrieved from <https://sustainabledevelopment.un.org/post2015/transformingourworld>. Access date 20.10.2019.
- United Nations. (n.d.). “Quality education: Why it matters”. United Nations – Sustainable Development knowledge platform. Retrieved from



[https://www.un.org/sustainabledevelopment/wp-content/uploads/2017/02/4\\_Why-It-Matters-2020.pdf](https://www.un.org/sustainabledevelopment/wp-content/uploads/2017/02/4_Why-It-Matters-2020.pdf). Access date 20.10.2019.

- Urban design. (n.d.). retrieved from <http://www.urbandesign.org/>. Access date 1.9.2019
- V&A online catalogue. (2017, January 26). Patchwork. Textile research center. Retrieved from <https://www.trc-leiden.nl/trc-needles/techniques/patchwork-and-quilting/patchwork>  
Access date 26.11.2019.
- Van Santen, J. (2016, November 22). Personal communication with Joost Van Santen [By email].
- Van Vliet, W. (1992). The cherry question or the role of social science research in designing against vandalism. *Vandalism: Research, Prevention and Social Policy*, 31.
- Varotsos, C., (n.d.). Costas Varotsos, Artist. Retrieved from <http://costasvarotsos.blogspot.com/>
- Vasconcelos, J. (n.d.). Joana Vasconcelos. Retrieved from <http://www.joanavasconcelos.com/index.aspx>.
- Vasconcelos, J. (2018, November 7). Personal communication with Joana Vasconcelos. Atelier of Joana Vasconcelos. Lisbon, Portugal [In-person interview].
- Vhils. (n.d.). About Alexandre Farto. Retrieved from <https://www.vhils.com/about/>. Access date 16.6.2020.
- Vicarte. (n.d.). Retrieved from <https://vicarte.org>.
- Vicente, S., & Fróis, V. (2017). Escultura Cerâmica Pública: A Relação Produtiva Entre A Arte, Municípios E A Indústria. *Revista Nupeart*, 18, 122-138.
- Vieira, A. L. (1940). Onde a terra se acaba [e o mar começa]. Livraria Bertrand.
- Visconti, L. M., Sherry Jr, J. F., Borghini, S., & Anderson, L. (2010). Street art, sweet art? Reclaiming the “public” in public place. *Journal of consumer research*, 37(3), 511-529.
- Vitin, E. (n.d.). Architectural Glass sculpture “In Nature”. Retrieved from <https://www.ernestvitin.com/architectural-glass-sculpture>. Access date: 8.8.2019.
- Vogel, N. A., & Achilles, R. (1993). The preservation and repair of historic stained and leaded glass.
- Wansborough, M., & Mageean, A. (2000). The role of urban design in cultural regeneration. *Journal of Urban Design*, 5(2), 181-197.
- Watkins-Baker, H. (2010). Kiln forming glass. Crowood.
- Watkinson, C. (2013). The Changing Nature of Architectural Glass A narrative of one artist’s commissioned works realised between 1990 and 2012 in the North East of England (Doctoral dissertation, University of Sunderland).

- Watkinson, C. (2020, July 9). Personal communication with Cate Watkinson [Via Zoom application].
- Wheeler, B. (2013, January 23). Why are vandalism rates falling? BBC News Magazine. Retrieved from <https://www.bbc.com/news/magazine-21041160>.
- Whitehouse, D. (2012). *Glass: a short history*. Smithsonian Inst Press.
- Whitehouse, D., & Brill, R. H. (2005). *Sasanian and post-Sasanian glass in the Corning Museum of Glass*. Hudson Hills.
- Wigginton, M. (1996). *Glass in Architecture*, Phidon, London.
- Wightman, K., 2011. *The development and application of creative printmaking processes for the decoration of blown glass* (Doctoral dissertation, University of Sunderland).
- Williams, M. (1986). Culture. In *Society today* (pp. 26-31). Palgrave, London.
- Winter, R. A. (1992). Metro Awareness Program: Education, Enforcement, and. Vandalism: Research, Prevention and Social Policy, 135.
- Wise, J. (1982). A gentle deterrent to vandalism. *Psychology Today*, 16(9), 31.
- Wise, N., & Harris, J. (Eds.). (2017). *Sport, events, tourism and regeneration*. Taylor & Francis.
- WiseMiles, M. (1997). *Art, space and the city: public art and urban futures*. Psychology Press.
- Wodiczko, K. (1987). Strategies of public address: which media, which publics? *Discussions in Contemporary Culture*, 1, 44-45.
- Worth, R. (2015). *Going Away, Coming Home - Hung Liu*. Retrieved from [https://worthphoto.photoshelter.com/gallery-image/Going-Away-Coming-Home-Hung-Liu/G0000vmiovKjQdRk/I0000yGCqBEB\\_fgU](https://worthphoto.photoshelter.com/gallery-image/Going-Away-Coming-Home-Hung-Liu/G0000vmiovKjQdRk/I0000yGCqBEB_fgU). Access date: 7.8.2019.
- Xing, N., & Siu, K. W. M. (2010). Historic Definitions of Public Space: Inspiration for High Quality Public Space. *International Journal of the Humanities*, 7(11).
- Yair, K., Tomes, A., & Press, M. (1999). Design through making: crafts knowledge as facilitator to collaborative new product development. *Design Studies*, 20(6), 495-515.
- Yavari, H. (2012) *Handmade glassware in Iran*, Sooremehr publications, Tehran, Iran.
- Zareie, M., (2014). Sanandaj city of Orsi: Study of the formation and expansion of Sash windows art based on existing portfolios. *Study of the architecture of Iran*.109-130.
- Zebracki, M. (2013). Beyond public artopia: public art as perceived by its publics. *GeoJournal*, 78(2), 303-317.
- Zebracki, M. (2014). Public art as conversation piece: Scaling art, public space and audience. *Belgeo. Revue belge de géographie*, (3).

Zubkoff, A. (2016, January 22). The Great Banksy. Retrieved from <https://www.linkedin.com/pulse/great-banksy-arthur-zubkoff/>. Access date: 2.5.2019.

## Appendix 1: The Required Budget and Expected Support for the Discovery Sails Project

For the execution of the *Discovery Sails* project, it is expected that the Municipality of the Marinha Grande and the commander support the following cost of the project:

- The project is estimated to require 30kg (about 66lbs) of Ultra-Grade Glow Stone (10-12mm) Emerald yellow, and 16kg (about 35lbs) of Ultra-Grade Glow Stone (10-12mm) Blue sky for decorating of 15<sup>m2</sup> basement of the project. In total, the project requires 101lbs of Ultra-Grade Glow Stone. The AGT™ group offers to sponsor of only 30lbs. The cost of the remaining 71lbs of Ultra-Grade Glow Stone is about \$4000 and the shipping cost for the total 101lbs is about 1500€. The artist expects the support of **5500€** (this is the estimated price we got in February 2018, please consider it may increase) for the Ultra-Grade Glow Stone.
- NEMOTO Company will provide 3000g of luminescent frits which cost 180€/kg. The total cost of 3kg the luminescent frits is about 540€.
- The project also requires the enamel and medium which will cost **500€** (this is the estimated price we got in February 2018, please consider it may increase).
- To buy the float glass (Extra Claro 6mm) for painting and applying the luminescent frits, which will cost **700€**. An extra cost of **350€** is also considered for failure or breakdown during the execution of the project. The municipality of Marinha Grande also needs to pay for the transportation of the float glass panels to CENCAL. This is the estimated price by Vidraria Fonseca in Porto<sup>158</sup>.
- The expenses of the tempered glass which will be used for preventing vandalism. It costs about **2500€**. This is the estimated price by Vidraria Fonseca in Porto. The municipality of Marinha Grande is responsible for the transportation of the tempered panels to the factory for making the metal frames and after that, from the metal frame factory to the final installation site.

---

<sup>158</sup> <http://vidrariafonseca.pai.pt/>

- For safety, the aluminum frames are designed to seal all the edges of the glass panels. The cost of this phase is about **4500€** (This is including the cost of making frames and transportation of the glass panels and frames from Fafe to Marinha Grande) and as the factory is located out of Fafe, we need the support of the Municipality of Marinha Grande for the transportations of painted glass panels from Cencal to Fafe.
- The cost of hiring two workers for 7-10 working days to help the artist for the execution of the basement. The cost of the cement for the basement of the project is also should be considered. Besides, the cost of hiring 2-4 workers for 2-4 days to install the final panels. The estimated price for hiring workers plus the cement, sands, metal structure for the basement, and additional requirements is about **4000€**.
- The cost of transportation of the project is estimated about **3000€** including:
  - Transportation of the float glasses from glass shop to CENCAL.
  - Transportation of the glass panels from CENCAL to the factory for making aluminum frames in Fafe.
- The artist has conducted some consultation with Dr. Hossein Kamalpoor, an architect, to design the frames. To install the work on the site, an architect, Dr. Hossein Kamalpoor, should also be available to oversee the implementation of the frames and glass panels. The municipality of the Marinha Grande is expected to pay the **1000€** cost of traveling the architect to Marinha Grande for the installation of the final pieces.
- The artist expects travel support and accommodation for the project. The Municipality could either allocate the allowance for the meals or include it in the accommodation. The artist needs to stay in Marinha Grande for about 4 to 6 weeks and travel between Lisbon, Porto, Aveiro, and Marinha Grande as well as between the CENCAL Corporation and the artwork site. The estimated price for travel and accommodation during the execution and creation of this project is about **4000€**. The estimated price is depending on the place of accommodation (this could be reduced or increased).

To start and to execute this project, first, we need to get the confirmation in a formal letter and make a formal contract with the Municipality of Marinha Grande. Then, it is necessary to get the budget in advance that we can buy and order the materials. The estimated price for this project is about **26,000€**. It can be paid once to the artist through a contract, or the Municipality of Marinha

Grande could pay in several installments during the execution of the project in advance of each phase. Please notice that the estimated budget is for the fiscal year, and if the project is not executed in the year 2018 (which probably will not), there may be unpredicted expenses and the prices may increase.



## Appendix 2: Terms of Execution and Delivery of the Discovery Sails Project

The *Discovery Sails* project is designed to be executed in the city center of Marinha Grande and to be created in CENCAL in Marinha Grande.

- I, Parinaz Faghihi, conducted the research for the *Discovery Sails* project. I also communicated with all the partners and hopefully got the support of AGT, NEMOTO, VICARTE, and CENCAL. I contacted different companies and factories to get the estimated prices of tempered glass and creating frames for this project such as GRUPO SOSOARES, Espelhos do Liz, Vidraria dos Peões, Vidreira Cacém, and Cristalmax industria de vidro. Until October 2018, none of them answered. But finally, the Vidraria Fonseca in Porto estimated the cost of tempered glass and optical glass (vidro extra claro). I am responsible for creating the glass panels (painting and applying the luminescent frits on the glass panels). I am also responsible for managing and overseeing the implementation of all project stages.
- A factory will create the toughened glass and another factory in Fafe will make aluminum frames for the glass panels. We are trying to find a factory in Marinha Grande or Leiria that makes the frames and toughened glass in the same place to reduce the cost of transportation.
- In the *Discovery Sails* project, an individual panel next to the public glass art is provided to the sponsors for putting their logos of companies in return for their sponsorship.
- It is the responsibility of the municipality of Marinha Grande to keep this public art clean after the installation of the project. Site cleanness reduces the risk of vandalism.
- The municipality of Marinha Grande is in charge of all potential taxes for this project.

## Appendix 3. Interviews

In this appendix, we presented the interviews that we had through email (questions and answers) as well as the informed consent form our interviewees.

### Interview with Joost Van Santen

The interview with Joost Van Santen was conducted on the 22<sup>nd</sup> November 2016 by email. The followings are the questions and answers and the informed consent for the interview:

- Parinaz Faghihi: Why did you choose the glass as a material to execute your public artwork?
- Joost Van Santen: Glass can be a beautiful material. The colored glass windows in the old cathedrals show the value of glass. Not only the colors are beautiful, also the irregular hand-blown surface. The transparent characteristic offers me the possibility to use the material to show sun projections, which create dynamic images my commissions in architecture and sculptures. They add value to the physical appearances of the art works.
- Parinaz Faghihi: What are your significant glass artworks?
- Joost Van Santen: See my website

<<http://joostvansanten.nl/amersfoort1.html>>

<<http://joostvansanten.nl/genk1.html>>

<<http://joostvansanten.nl/genk-facade1.html>>

<<http://joostvansanten.nl/heemskerk1.html>>

<<http://joostvansanten.nl/lady1.html>>

<<http://joostvansanten.nl/bloemendaal1.html>>

<<http://joostvansanten.nl/zwolle1.html>>

<<http://joostvansanten.nl/genkglasbeeld1.html>>

<<http://joostvansanten.nl/freaylemaborg1.html>>

<<http://joostvansanten.nl/veldhoven1.htm>>

<<http://joostvansanten.nl/bench1.html>>

<<http://joostvansanten.nl/sculpture1.html>>

- Parinaz Faghihi: What would be the importance of public glass art in your opinion? Or in your opinion why the glass is important in public art and public spaces?
- Joost Van Santen: See <<http://www.spoorbeeld.nl/labels/glaskunst>> It is a durable beautiful material to use.
- Parinaz Faghihi: What are the factors that persuade you choose a special place to install your works?
- Joost Van Santen: The collaboration with the architect. It offers the possibility to give an extra value to the architecture.
  
- Parinaz Faghihi: Do you know any public glass art which was vandalized? If yes, what were the reasons?
- Joost Van Santen: In most cases I use glass out of reach. Sometimes the environment is safe.
  
- Parinaz Faghihi: What can be done in your opinion to prevent vandalism on public glass art?
- Joost Van Santen: To mount the glass at places where it cannot be reached.

### INFORMED CONSENT FOR INTERVIEWS

I, Joost van Santen, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

Joost van Santen Date: 22 NOV 2016  
Signature of Interviewee

[Signature] Date: 22.11.2016  
Signature of Interviewer

## Interview with Alexandra Abreu

The interview with Alexandra Abreu was conducted on the 7th November 2017 in the Escola Superior de Design in Caldas da Rainha (ESAD), Portugal. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, ALEXANDRA M. F. AIRES DE ABREU, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

Alexandra Abreu Date: 7/11/2017  
Signature of Interviewee

[Signature] Date: 7, 11, 2017  
Signature of Interviewer

## Interview with Fernando Carradas

The interview with Fernando Carradas was conducted on the 7th November 2017 in the Escola Superior de Design in Caldas da Rainha (ESAD), Portugal. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, Fernando José António Carradas, agree to be interviewed by Parinaz Faghili. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

Fernando José António Carradas Date: 7, 11, 2017  
Signature of Interviewee

[Signature] Date: 7, 11, 2017  
Signature of Interviewer



## Interview with Dr. José Frade

The interview with Dr. José Frade was conducted on the 7th November 2017 in the Escola Superior de Design in Caldas da Rainha (ESAD), Portugal. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, João Manuel António Barros Coimbra Frade agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

João Manuel Frade  
Signature of Interviewee

Date: 7, 11 / 2017

[Signature]  
Signature of Interviewer

Date: 7, 11, 2017

## Interview with Joana Vasconcelos

The interview with Joana Vasconcelos was conducted on the 7<sup>th</sup> of November 2018 in Joana Vasconcelos atelier, Lisbon, Portugal. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, Joana Vasconcelos, agree to be interviewed by Parinaz Faghghi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

Joana Vasconcelos Date: 7-11-2018  
Signature of Interviewee

Parinaz Faghghi Date: 7.11.2018  
Signature of Interviewer

## Interview with Daniela Pinheiro

The interview with Daniela Pinheiro was conducted on the 25<sup>th</sup> of June 2020 by email. The followings are the questions and answers as well as the informed consent for the interview:

- Parinaz Faghihi: Could you please introduce yourself and explain how did you interested in glass art?
- Daniela Pinheiro: Hello. My name is Daniela Pinheiro. I'm a visual artist which works with geometry, abstraction, colour, oil painting and glass. I was introduced to glass in my graduation at the Faculty of Fine Arts of Oporto. In that time (2015-2016) I chose to ingress in some subjects whose main goals were to introduce us some techniques of manipulating glass. The possibility to work with color, transparency and fusing glass was, at the time, what linked me to the technique of fusing and to the goal of creating some art pieces with glass. After the graduation I continue to work punctuality with the material. At the end of 2017 (from October to December), connected with my masters degree in Painting in the Faculty of Fine Arts, I had the opportunity to do an internship in CENCAL, a center of professional qualification in glass. There I could explore the technique of fusing with colour glass – until here I just had worked with colour through the process of painting glass. This experience was very important to consolidate all the knowledge that I acquired at the faculty and apply it in the materialization of two glass pieces of bigger scale.
- Parinaz Faghihi: When did you start working as a professor? Why did you decide to become a professor in the university?
- Daniela Pinheiro: In 2018, the Polytechnic Institute of Viana do Castelo was looking for someone with knowledge and practical experience in glass art to give some classes in the degree of Visual Arts. For that, they contacted the Faculty of Fine Arts of Oporto. That was my luck, because professor Teresa contacted me with their proposal, which I accepted immediately. So I think that my choice was a question of opportunity.

- Parinaz Faghihi: Could you please explain what techniques were taught in the university you lectured?
- Daniela Pinheiro: In the last two years we worked mainly with the processes of cutting, painting and engraving glass. I also encouraged the students to incorporate other materials in their works, creating a mix of glass and other techniques: like wood, metal, clay or tissue. Also, worth mentioning that we don't work with hot glass techniques because we don't have technical conditions to that at the school. On the other hand, this year the approach has been quite different, because of the changes that all of us suffered with the world health conditions. We worked only through video conference, what made impossible the contact of the students with the kiln and the process of painting glass. However, the students made a group of experimentations where the glass was a subject material for projects in photography, video, sound, installation, drawing, painting or sculpture. Thanks to that we could perceive a lot of visual dynamic increase with broken bottles, or flasks, and combined materials and techniques.
- Parinaz Faghihi: What is your experience as a professor in this institution?
- Daniela Pinheiro: My relation with the institution is very punctual. They requested my services in the begging of the second semester and I just went to the facilities to give the classes. For that reason, I don't have the total responsibility for the subject and for the acquisition of materials, what in part difficults the possibility to increase the conditions to teach hot glass techniques, like sumpling, fusing, casting or pâte-de-verre.
- Parinaz Faghihi: How do you consider the relationship between professor and student?
- Daniela Pinheiro: As a professor I tried to cross the goals of the degree and the subject with the interests of each student. The classes are mainly a compromise between me and each student. In the first classes I assume a condition of someone who exemplifies and demonstrates each technique, after that I become someone who is totally available to give advices about their projects, to answer their questions or to make new experiences related with their projects. I try to establish our relationship with a strong dialogue that crosses their interests with the potentials of glass as a material.

- Parinaz Faghihi: How the glass art education that is offering in universities can affect the improvement of glass art?
- Daniela Pinheiro: In terms of a degree I think that the improvements are not very visible, maybe the biggest opportunity is to show the students the possibilities of the material and, eventually, increase their interest to explore and learn more about all the techniques that surround it. On the other hand, my main goal as a teacher, right now, is to show the students how we can cross the glass with other mediums to create works of art.
- Parinaz Faghihi: What improvements do you consider that the university should make towards glass teaching?
- Daniela Pinheiro: The Institute where I teach just opened, a few years ago, the degree of Fine Arts. For that reason, the work space doesn't have the best conditions and the best equipment to explore deeply all the possibilities of glass. But what I think that is more important is how we can transmit how simple gestures or manipulations can lead us to great results. Obviously, if the Institute could invest in an improvement of the workshop space, bigger kilns, controls of temperature appropriated to glass techniques and different types of glass, beyond transparent float glass, we could do more and improve the knowledge of the students relatively to other techniques (ex.: patê-de- verre).
- Parinaz Faghihi: Do you think any of your students will continue working in the glass art area after graduation? Are your students usually continue working in glass art?
- Daniela Pinheiro: My experience as a teacher is very short, so I don't yet have the perception if my students continued to work or not with glass or incorporated glass in their works. On the other hand, I also think that is very difficult for someone to start working entirely in glass art just with three months of contact with the material, and with cold techniques of manipulation. What I hope is that this contact gives them a desire to know more about glass and explore other ways of manipulating it.

## INFORMED CONSENT FOR INTERVIEWS

I, Daniela Ferruina Pinheiro, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

Daniela Ferruina Pinheiro Date: 25/06/2020  
Signature of Interviewee

[Signature] Date: 25,6,2020  
Signature of Interviewer



## Interview with João Silva

The interview with João Silva was conducted on the 14<sup>th</sup> of September 2016 by email. The followings are the questions and answers as well as the informed consent for the interview:

- Parinaz Faghihi: Why did you choose the glass as a material to execute your public artwork?
- João Silva: I chose the glass because it interested me in plastic and aesthetic terms - glass is light: it has a special and eternal kind of imateriality.
  
- Parinaz Faghihi: What are your significant glass artworks? Do you have other glass works installed in public spaces?
- João Silva: My most significant artworks are site specific installations. They are very much thought and conceived taking the site - architectural or landscape - in consideration, in a symbiosis that questions and challenges the viewer. The art installations are always temporary. I use photography to record my work. In my opinion, keeping the glass safe in public places is an almost impossible task, the risk is very high. Only in galleries and museums the glass is safe!
  
- Parinaz Faghihi: What would be the importance of public glass art in your opinion? Or in your opinion why the glass is important in public art and public spaces?
- João Silva: The glass is a magical material. And that produces a spell of attractiveness in almost everybody. It is fascinating the way the light changes every second on the glass surface. I think that the glass light, lightness and transparency is a pleasure for the eye ... The light and the fragile glass materiality is something that marvels and makes us dream about something that does not exist.
- 
- Parinaz Faghihi: What happened to your public glass artwork?

- João Silva: My work consists mainly of temporary artworks. In public spaces, I always photograph my artwork. This is a way of protecting it. Sometimes I leave my work in a specific public space for a few hours, and while I take the time to photograph it some people can enjoy it too – it's like a short experience. In between exhibitions, my glass pieces are safe in a private place. All of us that work with glass must be aware that we are working with a very delicate, fragile material that could easily break (even in a simple transportation, when the works are being moved) – that's just the way it is... It's important to be aware of this if you want to work with this particular material.
  
- Parinaz Faghihi: Why did you choose that place to install your work?
- João Silva: I always choose my places outside of art institutions - everyday life spaces. I like that. I generally choose the place thinking in the art piece I'm creating, but I can also choose a place to a piece that I've already created. The place and the piece must have a strong and intimate connection.
  
- Parinaz Faghihi: Do you know what was the reason that your public glass art was vandalized?
- João Silva: I think that the fragility of glass fascinates a lot of people, but at the same time calls for its destruction. It's easy to destroy or steal a glass work...who doesn't like to hear that "cracking sound"? I had some art installations vandalized, presumably by children or young people. The ease of breaking glass appeals to the very will of destroying it ... it's easy and quick. On the other hand, theft is performed more by adults fascinated by the material and the portable scale of the glass works, they want to have it a lot in their homes. I think these are the main reasons behind vandalization of art glass works.
  
- Parinaz Faghihi: What can be done in your opinion to prevent such this vandalism?
- João Silva: There's little you can do in unguarded places. In a public garden exhibition (Marinha Grande), we've tried some measures. In order to discourage people from vandalizing, we put

additional street lighting in the area, we wrote in the local newspaper that the area was under special surveillance (even if it wasn't particularly surveilled), we asked the police for more patrolling, etc. But it's difficult to control people's reactions. There's always a very high risk in public glass art exhibitions that have no vigilance.

### INFORMED CONSENT FOR INTERVIEWS

I, JOSÉ PEDRO FERREIRA DA SILVA, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

 Date: 21/4/2021  
Signature of Interviewee

 Date: 21.04.2021  
Signature of Interviewer

## Interview with Joana Silva

The interview with Joana Silva was conducted on two dates, the 24<sup>th</sup> May 2017 by email and 8<sup>th</sup> of March 2018 through a personal communication. The followings are the questions and answers as well as the informed consent for the interview:

- Parinaz Faghihi: Could you please introduce yourself and explain about your education and your experience in glass art?

- Joana Silav: Licenciada em Design Cerâmica e Vidro pela ESAD.CR. Atualmente, coordeno a formação da Área do Vidro no CENCAL – Polo Marinha Grande. Entre a minha licenciatura e o atual trabalho colaborei com o CRISFOFM – Centro de formação Profissional para o Sector da Cristalaria - enquanto colaboradora da área tecnológica do vidro. Neste período tive a oportunidade de adquirir a maior parte do conhecimento da arte do vidro. Cruzei-me com vários formadores de várias técnicas o que me permitiu ver de perto todo o processo de produção de vidro manual artístico. Nesta altura a proximidade com os formandos era grande e permitiu-me perceber os seus objetivos e interesses, toda essa experiência e informação que vivenciei facilita o meu trabalho hoje. Todo o meu percurso passa por experiências distintas mas sempre relacionados com a área do vidro. Entre o bacharelado e a licenciatura frequentei uma formação de 1200h, no CRISFORM, de várias áreas artísticas de vidro. Mas o meu conhecimento na matéria já vinha de trás. Desde que nasci até aos 16 anos o tempo livre era passado dentro de uma fábrica de Vidros, IVIMA - FÁBRICA DE VIDROS DA MARINHA GRANDE, aqui percorri todas as secções, a da pintura, pantogravura, lapidação, foscagem, embalagem, vidreiros, laboratório, ... sempre fui por todos.

Em suma, o meu trabalho é a utilizar toda a minha experiência, e fazer a partilha entre as várias gerações e os diferentes tipos de interesse e conhecimento.

- Parinaz Faghihi: when and how you got familiar with Cencal?

- Joana Silva: Quando estava a estudar Design – tecnologia para a cerâmica senti que a formação era muito teórica e pouco prática. Tinha necessidade de aprofundar os meus

conhecimentos na área do vidro e a ESTGAD – Escola Superior de tecnologia Arte e Design das Caldas da Rainha, não estava a conseguir preencher esse vazio. Eu vivia de perto a indústria do vidro e a informação transmitida ficava muito aquém do meu conhecimento nesta área. Pesquisei e na altura encontrei o CRISFORM – Centro de Formação Profissional para o Sector da Cristalaria. Fiz uma interrupção na licenciatura e fui tirar uma formação na área do vidro. A partir dessa data mantive sempre o contato. Quando terminei a licenciatura fui fazer um estágio profissional como designer, não gostei. E decidi renunciar a Licenciatura e trabalhar como condutora de forno no CRISFORM. E é nessa época que consigo absorver e aprender a grande parte do meu conhecimento em vidro. O CRISFORM foi extinto em 2011, e a área do Vidro passa a pertencer ao CENCAL – Centro de formação Profissional para o Sector da Cerâmica.

- Parinaz Faghihi: What do you do in Cencal?
- Joana Silva: Coordeno a formação do CENCAL Marinha Grande. Tenho como objetivo principal fazer formação nas diversas áreas do vidro, tanto artístico como industrial. Mantenho contato direto com as empresas e promovo parcerias com as escolas de Design e de artes plásticas. Faço disseminação junto dos Designer e artistas de forma a fazer crescer o interesse pelo vidro. Dou apoio técnico contínuo.
  
- Parinaz Faghihi: What is the role of Cencal in Improvement of glass art?
- Joana Silva: O CENCAL promove a formação de novos vidreiros, permitindo a continuidade da tradição e possibilita aos vidreiros profissionais aprenderem novas técnicas e partilhar conhecimento com outros vidreiros. Promove também a formação ao Designer e Artistas no sentido de despertar interesse e paixão pelo vidro. Uma vez fazendo formação no Cencal terá um apoio técnico contínuo. A formação é ministrada gratuitamente.
  
- Parinaz Faghihi: What techniques are taught in Cencal?

- Joana Silva: Formação em vidro Artístico: Vidro soprado | Kiln Working; Casting, Pâte de Verre e Fusign | Maçarico | Vitral Tiffany e Tradicional | Lapidação e Gravação | Acabamentos | Pintura.

Ministramos também toda a formação relacionada com produção de vidro industrial / automático e semiautomático e outras áreas transversais tais como; Brigadas de primeira intervenção, socorrismo, Qualidade, Gestão de equipas, Liderança, Higiene e segurança no trabalho, Vendas e Técnicas Comerciais, Informática, Línguas Estrangeiras, etc.

- Parinaz Faghihi: Who are the students that usually attend the workshops? (Please explain about their occupations and ages)
- Joana Silva: A formação do CENCAL é dirigida a adultos. Os protocolos assinados entre o CENCAL e as Escolas do Ensino Superior de Arte e Design faz com que a maioria dos formandos tenha idades compreendidas entre os 20 e 25 anos. Hoje, também há uma grande procura por Artistas e Designers consagrados e neste caso as idades pode ser muito dispersas. Para frequentar a formação não existe limite de idades.
- Parinaz Faghihi: Could you please explain a little about the impact of economy crises in the function of Cencal?
- Joana Silva: A formação do CENCAL é gratuita e permite que os projetos desenvolvidos durante a formação fiquem para o formando, isto representa uma grande oportunidade. O impacto da crise económica reflete-se na participação por não despendermos de dinheiro para a deslocação e estadia.
- Parinaz Faghihi: Regarding to your experience in working with glass, what would be the importance of public glass art in your opinion? Or in your opinion why the glass is important in public art and public spaces? And what can we do to improve glass art in public spaces?



- Joana Silva: É super importante a presença do vidro em espaços públicos, na arte pública. O vidro tem uma conotação utilitária e frágil. É urgente mostrar as grandes potencialidades do vidro. A arte pública é uma forma de fazer chegar ao público geral as suas potencialidades. O vidro tem uma beleza inigualável a qualquer outro material, o seu brilho e translucidez não deve ser privado à arte.

### INFORMED CONSENT FOR INTERVIEWS

I, Joana Alexandrina Gomes da Silva, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

  
\_\_\_\_\_  
Signature of Interviewee Date: 24 Maio 2017

  
\_\_\_\_\_  
Signature of Interviewer Date: 24.5.2017

### INFORMED CONSENT FOR INTERVIEWS

I, Joana Alexandrina Gomes da Silva, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

 \_\_\_\_\_ Date: 8 Março 2018  
Signature of Interviewee

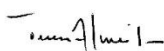
 \_\_\_\_\_ Date: 8.3.2018  
Signature of Interviewer

## Interview with Dr. Teresa Almeida

The interview with Dr. Teresa Almeida was conducted on the 17<sup>th</sup> April 2020 via Skyp application. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, Teresa Maria Castro de Almeida agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.



\_\_\_\_\_  
Signature of Interviewee

Date: 17.04.2020



\_\_\_\_\_  
Signature of Interviewer

Date: 17.04.2020

## Interview with Dr. Fernando Quintas

The interview with Dr. Fernando Quintas was conducted on the 3<sup>rd</sup> November 2020 via Zoom application. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, Fernando Manuel Baete Quintas agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.



\_\_\_\_\_  
Signature of Interviewee

Date: 03.11.2020



\_\_\_\_\_  
Signature of Interviewer

Date: 3.11.2020

## Interview with Conceição Cabral

The interview with Conceição Cabral was conducted on the 26<sup>th</sup> February 2020. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, Conceição Cabral, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

Conceição Cabral Date: 26 de fevereiro 2020  
Signature of Interviewee

[Signature] Date: 26.02.2020  
Signature of Interviewer

## Interview with Andrew Moor

The interview with Andrew Moor was conducted on the 12<sup>th</sup> August 2016 by email and here are the questions and answers:

- Parinaz Faghihi: Why did you choose the glass as a material to execute your public artwork?
- Andrew Moor: I am a glass artist. This is the medium that I work in and in which I am a specialist.
  
- Parinaz Faghihi: What are your significant glass artworks?
- Andrew Moor: Some of my works were designed by myself, others in collaboration with other artists. I attach some photos of my larger external public artworks.
  
- Parinaz Faghihi: What would be the importance of public glass art in your opinion? Or in your opinion why the glass is important in public art and public spaces?
- Andrew Moor: I think glass is a great medium for public art because:
  - a. It is kinetic; it will change with the weather, the seasons and the light.
  - b. It can be monolithic, standing alone; or it can be integrated into architecture, either as cladding, glazing, balconies, canopies etc.
  - c. It can also be made to light up, so the work contributes during day and night.
  
- Parinaz Faghihi: What are the factors that persuade you choose a special place to install your works?
- Andrew Moor: It is normally my client who chooses where he wants the work, although sometimes the brief is quite open about exactly where or how!
  
- Parinaz Faghihi: Do you know any public glass art which was vandalized? If yes, what were the reasons?



- Andrew Moor: It has happened once, but is remarkably unusual. I always remind clients that everyone can walk down a high street and break every shop window. But they do not. An external public glass artwork needs to be robust and in a well-lit public space.
- Parinaz Faghihi: What can be done in your opinion to prevent vandalism on public glass art?
- Andrew Moor: It is about exposure. Some things are tempting, some things are not. The site must be well-lit at ALL times and be kept clean. Nothing deters vandalism more than the clean presentation of a site.

Another interview with Andrew Moor was conducted on his studio on the 25th of July 2017 in London, England. The interview is recorded and the following is the informed consent for the interview:

#### INFORMED CONSENT FOR INTERVIEWS

I, Andrew Moor, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

 Date: 25-7-17  
Signature of Interviewee

 Date: 25.7.2017  
Signature of Interviewer

## Interview with Louis Thompson

The interview with Louis Thompson was conducted in London Glassblowing (Hot-glass workshop and gallery) in London, England, on the 28 of July 2017. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, LOUIS THOMPSON, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

  
Signature of Interviewee

Date: 28/07/17.

  
Signature of Interviewer

Date: 28. 7. 2017

## Interview with Dr. Vanessa Cutler

The interview with Dr. Vanessa Cutler was conducted on the 17<sup>th</sup> June 2020 by email and here are the questions and answers:

- Parinaz Faghihi: Could you please introduce yourself and explain how you get interested in glass art?
- Vanessa Cutler: I was interested in jewellery or glass, I knew I wanted to make and learn a craft and when visited many institutions around the country and instead of a degree went for a 3 year HND in stained glass. I became interested whilst doing a foundation course, although didn't do any glass but through open days and visits I gained insight to the direction I wanted to go. Today I am still interested in jewellery and make the old piece occasionally.
- Parinaz Faghihi: When did you start working as a professor? Why did you decide to become a professor in the university?
- Vanessa Cutler: I don't think you always choose the path, initially on completing in Swansea went to make my qualification into degree at Wolverhampton with the intention of possibly teaching. A year working in restaurant and doing the odd commission showed I wanted to learn more. whilst there I started doing commissions and fabricating glass for staff doing projects. Then became the architectural glass tech (1997-2000) when they decided to develop the architectural side of the department, whilst doing my Masters with them part time and doing the odd commission. After was ready to set up found a studio and did that alongside PT work. Then an opportunity to a PhD in Sunderland that led to doing some teaching of summer schools and short courses which evolved after the the PhD (2006) became a research Fellow at Sunderland. 2008 they advertised for a full time lecturer in architectural glass at Swansea, by that time had become Swansea Metropolitan University (now UWTSD). Full time glass positions do not get advertised very often as possibly as a former alumni and having that architectural underpinning I was appointed. The other courses around the country did an element of architectural glass but Wolves, Sunderland, Farnham were more focused on other areas such as hot glass, kiln-forming etc. That was something Swansea wasn't really doing at

that time and with by PhD using waterjet technology and the university getting a machine my knowledge and research fitted in for a time. Stayed till a restructure in 2015, and was awarded Professorship in 2013. Then left academia for two and returned to led a Product Design course at Chichester

- Parinaz Faghihi: Could you please explain what techniques were taught in the university you lectured?
- Vanessa Cutler:
  - At Wolverhampton they covered hot glass, kiln-forming, cold working and some architectural- Such glass and ceramics have come together but they of becoming separate again
  - Sunderland was the same glass and ceramics course, technology was starting to be introduced whilst and after the PhD, much screen-printing on glass was down as was many processes. Sunderland with the move the National Glass Centre was had quite a comprehensive glass department and lamp-working was introduced later. (the advent of European money plays a huge role in what was being taught as funds helped support the purchase of capital equipment and the scale of work also developed. Plus, the various techniques taught were influenced by those teaching. during my time doing the PhD and after the Czech casting and the research of Kevin Petrie on screen-printing was being taught
  - Swansea when I arrived was very much focused on stained glass with some small open casting, but they still had acid facilities, glass painting and glass history. A very skill based course that showed techniques. Live commissions and projects in each year group and the annual Steven's competition, run by the Glaziers. Since leaving I think it is now a design crafts course that is more multi disciplinary that offers various pathways glass being one.
- Parinaz Faghihi: What was your experience as a professor in this institution?

- Vanessa Cutler: My experience I may be able to comment on that as there are personal experiences (this question may need to be censored or only the researcher have the information and not be published)
  
- Parinaz Faghihi: How do you consider the relationship between professor and student?
- Vanessa Cutler: The relationship between the two is professional, occasionally some what it to be a friendship, that can only occur once the student has graduated
  - Some students come with different expectations- some see it as an extension of school
  - Others come not fresh from school maybe 10-40 years since being in an educational environment and therefor have life skills
  - So come part time and want to fit around their lives
  - Others it is a hobby not a careerpath
  - Some are passionate and want to succeed.
  
- Parinaz Faghihi: What is the role of education on the improvement of glass art especially in public spaces? How the glass art education that is offered in universities can affect the improvement of glass art?
- Vanessa Cutler: Very little apart from in Swansea was taught about art in public spaces as with many courses, briefs and modules are very student directed and therefore a group of 10 may be doing 10 different outcomes. However, through modules we would introduce making an architectural module and teach the various processes related to architectural glass from mirroring, painting, glazing, double glazing, toughening, appliqué the list is very thorough. Students were taught cartooning, scaling design and how to present those modules and pitching to clients. With live projects they gained experience. Many architectural glass skills are not covered in the same detail in other institutions and I would suggest the change to design crafts has been about the attracting more students who wanted to undertake full time degree course but with more open pathways that something to specific. Those young people

coming from school do not encounter glass the same way, architecture is using larger sheets and stained glass has become more ecclesiastical and smaller scale. In the UK the improvement in public spaces is not necessary from peoples training artists often are fine art or other mediums are chosen for glass commissions in public spaces.

This like glass art is subjective. Those who commission are going on the quality of the idea and the experience of the person undertaking the work. It is now more difficult as a new graduate to often gain those commissions due to the experience required in project managing such work. Many are made going through studios such as Proto and Derix and other studio in Germany. Many commissions are undertaken by painters and the glass artist acts as fabricator. What education should do is help give a context However there is an issue students are less interested in the academic side of the historical context and the need for students and the modular popular approach has now made it more selective in what is taught and those students who are really interested are expected to be self motivated and look into additional areas of interest themselves. Teaching has become more broad in context as students are not looking at doing glass in the same traditional ways as before. Many chose not to work in a studio, many look at become designer/makers and the craft fair is their domain. The concept as with fine arts it concept driven and is their own interpretation of the brief. The need to understand the construction considerations are taught / discussed but the in public art projects more likely to go to a glass fabrication studio to have the work made. However in small scale domestic work the students/ graduates are likely to undertake themselves if it were a stained glass commission on a smaller budget.

- Parinaz Faghihi: In your opinion, what are the reasons that the number of public glass art is less than other public arts? The glass fragility? Education? Culture?
- Vanessa Cutler: Combination of all three glass is still seen as that delicate material. However, in some countries it is being used more. In the UK we possibly rely on the same artists and those commissioning still look to the same people as they will produce a good result. Some are commissioned as their methodology is interesting and budget has that allowance or they artists fits into the subject matter. The way commissioning occurs has become less transparent and more people are applying from various medium sized budgeted commissions



and often the amount of money just about covers the manufacture. Many are prewritten contracts we set dates, no time allocation for detailed research or new developments. Often the arts budget is the first slashed when saving money. People seem unwilling to pay for design work and the culture of commissioning is to ask for much research work in the application without any payment. It is a culture of something for nothing.

Large commissions those choosing or paying have an idea of who they want to commission. Culture wise we have become more about the procedure and that stops many aspiring or good artists applying. Additionally, there are less commissions and that is due to politics and education. We are more selfish in terms of helping ourselves first rather than saying how can we improve our community. Often those commissioning can be via committee or the are works that need to evidence where money has been spent and therefore much community art rather than good quality long lasting legacy work.

- Parinaz Faghihi: What would be the importance of public glass art in your opinion? Or in your opinion why is it important to have glass artworks in public spaces?
- Vanessa Cutler: Any art is important in public space doesn't need to be glass, but needs to be good.
  
- Parinaz Faghihi: Do you have any public glass art? Can you speak about some pieces? What techniques and approaches did you take to prevent vandalism?
- Vanessa Cutler: Yes, I have worked in collaboration on projects with Cate Watkinson and we work with structural engineers to help demonstrate it is safe in a space. To prevent vandalism, you can't do anything that is down to the person who wants to cause criminal damage. What we do in our public art works is provide the assurance that the glass meets the standards and requirements for in a public space. We have mixed with other materials and studied the position and activity in that location.
- We have done seating- Baltic Butterfly seats in Gateshead, and the Southsea Grasses in Southsea Hampshire. I have also done stained glass commissions were protective glazing has been installed

- Parinaz Faghihi: What can be done in your opinion to prevent vandalism on public glass art?
- Vanessa Cutler: A better society that has pride in their surroundings

- Parinaz Faghihi: Do you know any of your students (who studied glass art courses) who continued working in the glass art area after graduation? Do your students usually continue working in glass art?

- Vanessa Cutler: A few students have gone the designer maker route setting up doing small glass pieces for fairs and shops. One or two are in restoration studios. Some still do glass between having children and other jobs. Others have gone onto postgraduate courses. Those having done PhD have gone into academia- glass / crafts. During my teaching there were many who come to do glass as a second or third career and therefore they can not move to where the studios might be and so like many glass courses the professional outcomes is usually as a designer maker.

In the UK we are lucky to have the Guild - The worshipful company of glaziers. They do the Steven's competition but also a 10 and 24-week work placement, a couple of former students have applied and won them and later go to work in studios.

The Worshipful company of glass sellers supports the British glass biennale and has a glass prize.

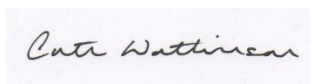
Another interview was conducted with Dr. Vanessa Cutler on 25<sup>th</sup> of June 2020 via Zoom application. The interview is recorded and the following is the informed consent for the interview:

## Interview with Dr. Cate Watkinson

The interview with Dr. Cate Watkinson was conducted on the 9th July 2020 via Zoom application. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, Dr Cate Watkinson, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers, and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.



Signature of Interviewee

Date: 09.07.2020



Signature of Interviewer

Date: 9.7.2020

## Interview with Dr. Jeffrey Sarmiento

The interview with Dr. Jeffrey Sarmiento was conducted on the 22<sup>nd</sup> of June 2020 via Zoom application. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, Dr Jeffrey Sarmiento, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

  
\_\_\_\_\_  
Signature of Interviewee

Date: 21 April 2021

  
\_\_\_\_\_  
Signature of Interviewer

Date: 21.04.2021

## Interview with Dr. Jessamy Kelly

The interview with Dr. Jessamy Kelly was conducted on the 23<sup>rd</sup> of June 2020 via Zoom application. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, Jessamy Kelly, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.



\_\_\_\_\_  
Signature of Interviewee Date: 23/06/20



\_\_\_\_\_  
Signature of Interviewer Date: 23.6.2020

## Interview with Dr. Arezoo Khanpour

The interview with Dr. Arezoo Khanpour was conducted on the 20th November 2020 via Zoom application. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, Arezoo Khanpour, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers, and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.



\_\_\_\_\_  
Signature of Interviewee Date: 2020, November 20



\_\_\_\_\_  
Signature of Interviewer Date: 20.11.2020



## Interview with Hayas Hosseini

The interview with Hayas Hosseini was conducted on the 17th January 2016 in Karaj, Iran and another interview was on the 12<sup>th</sup> September 2018 in Tehran, Iran. The following is the informed consent for the interviews:

**INFORMED CONSENT FOR INTERVIEWS**

I, Hayas Hosseini, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

\_\_\_\_\_  
Signature of Interviewee      Date: 12.09.2018

\_\_\_\_\_  
Signature of Interviewer      Date: 12.9.2018

Scanned with CamScanner

## Interview with Saeed Golkar

The interview with Saeed Golkar was conducted on the 10th January 2016 in Tehran, Iran. The interview is recorded and the following is the informed consent for the interview:

### INFORMED CONSENT FOR INTERVIEWS

I, SAEED GOLKAR, agree to be interviewed by Parinaz Faghihi. She can use the content of this interview in academic research such as PhD thesis, papers and articles. I also agree to participate in an electronically recorded interview. I understand this interview and the results of this study may be published in an academic journal or book.

Saeed Golkar Date: 10, 1, 2016  
Signature of Interviewee

[Signature] Date: 10, 1, 2016  
Signature of Interviewer

## **Appendix 4. Recorded interviews**

The recorded voices and videos through the interviews are delivered in a file to FBAUP and can be accessed at the national library.