

2023



# DEMO MAKER'S HANDBOOK

---

TIPS FOR CREATING DEMOS



## VAPRIIKKI

THE FINNISH MUSEUM  
OF GAMES



Photo: Saarni Säilynoja, Vapriikki photo archives

# CONTENTS

<b>1</b>	<b>Introduction to the demoscene</b> .....	<b>5</b>
	What is the demoscene? .....	5
<b>2</b>	<b>Visuality in demos</b> .....	<b>6</b>
	Starting points for a demo .....	6
	What do demos look like? .....	6
	Demos and the graphics artist .....	7
	Graphics tools and image archives .....	7
<b>3</b>	<b>Demos and sound</b> .....	<b>9</b>
	The role of sound and music.....	9
	Sound tools.....	9
<b>4</b>	<b>Demos and coding</b> .....	<b>11</b>
	A union of image and sound .....	11
	Notes on demo tools.....	11
	Programming tools.....	11
<b>5</b>	<b>Conceptualisation and design of a demo</b> .....	<b>12</b>
	Notes on creating a demo .....	12
	Conceptualising a demo .....	13
	Design tips.....	14
	Remember copyright.....	15
<b>6</b>	<b>The demo community and good manners</b> .....	<b>16</b>
	Principles of a safer space.....	16
	Demo groups and working together.....	17
	Copyright and licences.....	17
	Demo parties .....	18
	Authors.....	19
	Sources and links .....	19
	Template for conceptualisation .....	20
	Storyboard .....	22

## Welcome to the Demo Maker's Handbook!

It is our pleasure to present this material that was created as part of the project "Demoskenen uudet kasvot" (New faces of the demoscene) which was funded by the Finnish Heritage Agency. The project took place at the Finnish Museum of Games in the spring of 2023 when a series of seven workshops related to the demoscene were held for young people aged 13 to 19.

The contents of this handbook were compiled in collaboration with active members of the demoscene community. With great dedication, they have shared their know-how regarding the history of the demoscene, the audiovisual world of demos as well as demo coding and design. They have also opened the inner workings of the community to us and considered the possible future directions for the further development of the community. We invite people of all ages to learn about the demoscene, as it offers a unique opportunity to experience and create audiovisual works of different types. This handbook offers information and useful tips for beginners and more experienced hobbyists alike.

The demoscene is an extensive and diverse world. We recommend that you learn about it online on the various forums (such as [www.pouet.net](http://www.pouet.net)) and also participate in the various demo parties. These include Instanssi in Jyväskylä, Zoo in Orivesi, Graffathon in Espoo and Alternative Party and Assembly in Helsinki, among others. These events allow you to meet members of the demoscene community face to face, share ideas, learn new things and, above all, spend time together.

We hope that this handbook will give you joy and inspiration to get involved with the demoscene. Let's explore, create and marvel at the fascinating demoscene creations together!

***Eljas Suvanto, Outi Penninkangas, Olli Nordling & Niklas Nylund***

## 1 INTRODUCTION TO THE DEMOSCENE

MARKKU "MARQ" REUNANEN

### What is the demoscene?

The demoscene is an international community creating audiovisual demonstrations – demos – that commonly combine programming, graphics and sound. The scene is especially active in Europe, but there are enthusiasts around the world. Finland has dozens of active demo groups who meet each other at various events called demo parties.

While demos are the key product of the demoscene, it also produces other digital content, such as music, graphics, videos and games. Competitions are an important part of the demoscene culture; they allow members to compete against each other in various challenges – compos, for short – related to programming, drawing or composing.

The demoscene started in the mid-1980s when affordable microcomputers became more popular. Demos were first related to software piracy, but nowadays the demoscene and online piracy are two separate phenomena. In Finland, the first demo groups and events came about with the popularity of the Commodore 64.

Currently, the scene mostly uses the Internet for sharing content and having discussions. The demoscene is also actively involved in the retrocomputing circles, and its members have created new content for old machines. Tradition and know-how is relayed to new members through events and competitions, for example.

Even though the demoscene has remained active and energetic, its future challenges will involve standing out from the diverse field of digital culture and attracting new members.



Watch the Finnish Broadcasting Company's demoscene documentary here: <https://areena.yle.fi/1-1295277> Read more about the demoscene here: <https://wiki.aineetonkulttuuriperinto.fi/wiki/Demoskene>

## 2 VISUALITY IN DEMOS

TOMMI "ELECTRIC" MUSTURI

### Starting points for a demo

Demos can be created in many different ways. They may have different sizes and durations. The hardware or platform used to present the demo sets specific limitations. For example, an old computer imposes limits on the number of colours, resolution and sound, and its small memory limits everything else – the memory of a Commodore 64 is only enough for a photograph the size of a small postage stamp. However, even demos running in a web browser will work better if they are optimised.

Modern computers have no limitations, which allows the demo creators to define the limits themselves. There are no rules to making demos – and this is very commonly the starting point for a demo: using the hardware or platform to do something that it has not been used for, or that is not its intended purpose. In addition to computers, demos can be created on game consoles, phones, pocket calculators, overhead projectors, peripherals such as disk drives, etc.

Specific hardware usually sets natural limits for the visuality of the demo, such as in the case of the Commodore 64: 16 colours, resolution of 320 by 200 pixels, various graphics modes. A demo usually aims at a harmonic, fluent and surprising experience where all areas (programming/effects, graphics and sounds) support each other. The graphics artist commonly has the main responsibility for the demo's visual appearance, but making a demo is nearly always a collaborative effort where everyone's opinions are welcomed.

### What do demos look like?

The appearance of demos has evolved with the development of hardware and tools. For example, the Commodore 64 demos of the 1980s mostly used pixel graphics, whereas PC demos of the 2000s were mainly based on 3D graphics. Older demos were commonly focused on programming, whereas newer demos are less disciplined and often contain animations. Nowadays, all of the tools and graphical oppor-

tunities are available to everyone. Since the hardware no longer sets the limits, graphics for modern demos can be created by drawing on paper or taking photographs, for example.

Demo aesthetics show the impact of contemporary popular phenomena from different time periods (films, music, youth culture, games, comics, etc.) and the author's own interests. The visual design of a demo is similar to the visual design of any other wor



**YouTube has a lot of different demos. A good channel for finding them is <https://www.youtube.com/@TheDemoTube>**

### Demos and the graphics artist

Graafikon työ demossa kattaa useita eri osa-alueita, kuten:

The work of a graphics artist in a demo covers several areas, such as the following:

- 1. Pixel graphics:** Static images created to a specific size using pixels.
- 2. Vector graphics/3D:** Graphics created from vectors or 3D models under the programmer's guidance.
- 3. Textures:** Used for backgrounds, 3D objects, etc. Textures create the appearance and feel of a surface.
- 4. Typography:** Designing fonts and logos and using them in the demo's visual appearance.
- 5. Designing the flow of the demo:** Combining all areas seamlessly into one fluent piece. This may also be technically challenging on older hardware.
- 6. Colours:** The demo's general colour scheme and the colours for the programmed effects.
- 7. Additional graphics:** Other graphical elements, such as cover art (dirart), disk tapes, sticker design and social media pictures.

### Graphics tools and image archives

#### Picture editing/drawing

<https://mrdoob.com/projects/harmony/> <http://weavesilk.com/>  
<https://sketchpad.app/en/> <https://paint.sumo.app/?lang=en>

## Pixel graphics

<https://www.piskelapp.com/>  
<https://www.pixelartcss.com/>  
<https://lospec.com/pixel-editor/>  
<https://www.aseprite.org/>  
<https://dinopixel.com/>  
<https://petscii.krissz.hu/>  
[http://www.kameli.net/marq/?page\\_id=2717](http://www.kameli.net/marq/?page_id=2717)

## 3D

<https://www.3dslash.net/index.php>  
<https://stephaneginier.com/sculptgl/> <https://rive.app/>  
<https://app.vectary.com/> <https://spline.design/>  
<https://clara.io/>  
<http://www.k-3d.org/>  
Image archives (check copyright!)  
<https://www.pexels.com/> <https://pixabay.com/>

## TIP!

Various parties such as museums are increasingly providing pictures of their works under a CCO licence if the copyright on the work has expired.

Did you know that the Finnish National Gallery, for example, has more than 20,000 pictures on its website that you can freely use under the CCO licence? On the Finnish National Gallery's website, these are marked as "Copyright Free" on the banner below the image. If you find this marking next to an image, you can share, edit and utilise the image however you like. For example, you can use it for education, research or for commercial purposes.

[www.kansallisgalleria.fi](http://www.kansallisgalleria.fi)

## 3 DEMOS AND SOUND

JONNE "PURPLE MOTION" VALTONEN

### The role of sound and music

Sounds and music are an important part of the demoscene since, in addition to creating the atmosphere and a holistic experience, they also affect the storytelling and plot.

Demoscene music is commonly electronic and composed especially for the demoscene. Soundscapes range from atmospheric music to energetic rhythms. Composers use tracker software, for example, which allows for creating complex pieces and various types of sounds. Sounds in the demoscene are not limited to music; they can also include sound effects, samples and speech. Sounds – and silence – add energy and variation to a demo. Works by other composers and sound effects created by others may also be used if the original author has given permission to do so.

Music and sounds are important in demos. They influence the overall mood of the work, evoke emotions and relay messages to the spectator. They are an important part of the demoscene, both artistically and technically.

## CHALLENGE

Watch a completed demo on YouTube with the sound off. Then, watch it again with the sound on. How did sound influence the demo?

You can also try changing the demo by replacing the soundtrack. Try some different music and examine how different sounds will affect the mood and plot of the demo.

### Sound tools

#### Sound editors

<https://www.beepbox.co/>  
<https://sb.bitsnbites.eu/> + ohje <https://sb.bitsnbites.eu/help.html>

#### Trackers

<https://schismtracker.org/>  
Protracker: <https://16-bits.org/pt2.php>  
Fast Tracker II: <https://16-bits.org/ft2.php>



## Sound resources

<https://freemusicarchive.org/>

## Others

<https://www.tracktion.com/products/waveform-free>

<https://www.bandlab.com/products/cakewalk>

<https://ardour.org/>

<https://www.akaipro.com/mpc-beats>

<https://serato.com/studio>

<https://soundbridge.io/>

<https://zynewave.com/podium-free/>

<https://www.bespokesynth.com>

Photo: Saarni Säilynoja, Vapriikki photo archives



## 4 DEMOS AND CODING

### RIMINA

#### A union of image and sound

At their best, demos create an experience where sound and graphics work seamlessly together. Synchronising the music and effects with the visual elements creates a powerful experience where the various components support each other. Synchronisation allows for emphasising specific visual elements and creating impressive effects.

#### Notes on demo tools

Various demo tools have been developed over the years, and they offer assistance in creating demos. Some tools focus on making it as easy as possible to synchronise music and image. Meanwhile, other tools focus on facilitating the creation of 3D worlds in order to allow for more complex visual effects. There are also tools that require no coding skills, which makes them more easily approachable to a wider user base. Software suites such as Unity and Unreal Engine, which are commonly used to create games, have also become more popular in the demoscene.

Demo groups commonly have their own tools or templates that make it easier to create demos. However, it is important to note that using templates or tools does not make the demos any worse or less “genuine” when compared to demos created “from scratch”. These are useful resources that help with creating demos.

#### Programming tools

<https://cables.gl/>

<https://github.com/rocket/rocket>

<https://github.com/framefield/tool>

<https://github.com/mrdoob/three.js>

## 5 CONCEPTUALISATION AND DESIGN OF A DEMO

### Notes on creating a demo

#### TOMMI “ELECTRIC” MUSTURI

Creating a demo commonly starts with establishing limits and creating a plan. Here are some common starting points and approaches for creating a demo:

- 1. Which hardware will the demo be made for:** Decide on whether the demo will be for retro hardware, modern hardware, a browser or without any limitations, like a Wild Demo.
- 2. Story or message:** Define a script or message that is supported by all areas of your demo. This gives you direction for building your demo.
- 3. Theme:** Pick a theme, such as spring, Halloween, COVID-19, war, Museum of Games, breakfast table and so on, which then guides the visual appearance and contents of the demo.
- 4. Visual style:** Decide on a visual style, such as graffiti, anime, cinematic, retro, space, glitch and so on, which gives the demo a signature look.
- 5. Mood:** Define the desired mood: light, dark, humorous, etc. that affects the general appearance and feel of the demo.
- 6. Colour scheme:** Decide on a colour scheme – such as bright, black and white or specific colours only – to provide visual harmony across the different areas of the demo.
- 7. Soundscapes:** Pick a soundscape, such as different musical styles or background sounds that support the mood and message of the demo.
- 8. Transitions and tempo:** Decide on the transition styles and the tempo for the demo, such as fast, slow or variable, which affects the rhythm and narration of the demo.

The members of the group may also work on different parts and then join them together by various means, such as by using the colour scheme, sounds, transitions or programming. A demo can also be created around an existing piece of music or it can be divided into different, limited parts.

It is important to identify your own strengths or those of your group and then to build the demo around them. This way, the skills of the authors are used in the best possible manner for a high-quality outcome.

### Conceptualising a demo

#### MIKA “WAFFLE” RAUTIO

##### 1. Where to start? Come up with an idea and add to it.

First, you should come up with an idea or concept for your demo. Think about the message or experience you wish to convey. When an idea exists, you can supplement it by adding details and making adjustments.

**2. Use bullet points for your scenes, a storyboard or similar.** Bullet points or a storyboard help you visualise the various scenes contained in your demo and their order. This helps you understand the visual storytelling and progress.

**3. Define a deadline and decide where and when you want to publish your work.** It is important to set a concrete deadline for your demo, such as an event or competition where you want to release it. This helps you stay on schedule and motivates you to complete the project.

**4. Get the necessary people on board and be realistic about the available time.** If you need other people, such as programmers, artists or musicians, make sure that they are onboarded on time. Ensure to also be realistic about your own schedule. Consider how much time you have available and design the project accordingly.

## Design tips

MIKA “WAFFLE” RAUTIO

- 1. Do not set excessively high standards for yourself and do not compare yourself to others.** It is important to be kind to yourself and understand that working with demos is a learning process. Do not compare yourself too much to others; focus on your own development.
- 2. Focus primarily on completing the demo, not on the technology or rankings.** Even though technology and ranking may be important, you should primarily focus on completing your demo and having it run. You can always improve your technology and rankings later.
- 3. A good starting point is to create a “minimum viable product” and improve on it.** First think of a “minimum viable product”, a minimum version of your demo that will work. After this, you can focus on improving it and adding features.
- 4. A good maximum duration for an effect or scene is 20 to 40 seconds.** Focus on effective and impressive content. Usually, a scene that lasts between 20 and 40 seconds is long enough to be interesting.
- 5. A short demo is better than a long one.** Optimal length: 20 to 180 seconds. Demos do not need to be long. Keep your demo short enough to keep the viewer interested. A good length can vary between 20 and 180 seconds.
- 6. A scene is more interesting when the entire screen is full of content.** Use all of the screen estate and fill it with interesting content. This makes the demo visually more interesting and attractive.
- 7. Do not place important content on the edges of the screen** (avoiding any possible obstructions to the view). Make sure that your important content is in the middle of the picture and not at the edges so that it is clearly visible. This will avoid any problems caused by obstructions at events.
- 8. Details and text should be large enough to see clearly.** Make sure that your details and text are large enough in order to make them

clearly visible. This ensures that the viewers can fully enjoy the content of your demo.

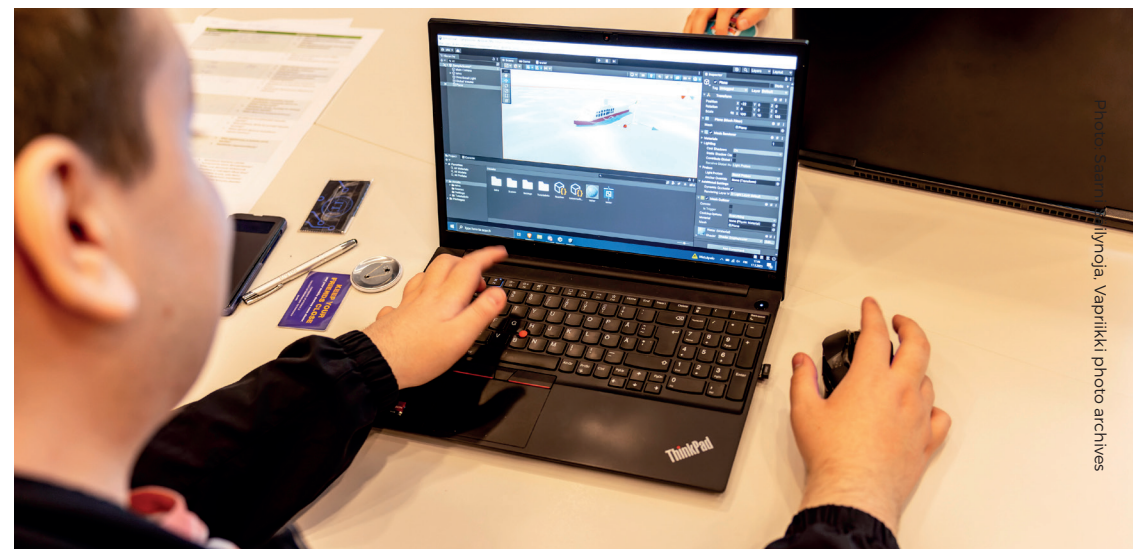
### **9 Remember that a video projector has poorer contrast and brightness than your monitor.**

If you want to project your demo on a big screen or show it on a video projector, remember that contrast and brightness may be worse than on your own monitor. Make sure that your visual content will work even under these conditions.

## Remember copyright

MIKA “WAFFLE” RAUTIO

- 1. If you use any work from others in your demo, check the licence terms and follow them.** If you use elements created by others, such as music, graphics or program code, check the licence terms for these elements and make sure you are allowed to use them in your demos. Adhere to the terms and give credit to the original authors.
- 2. Crediting the original authors is common courtesy, even if they do not require it.** Even though the original authors might not require credit, it is a good practice to acknowledge them anyway. Mention any original authors who contributed to your demo and value their work in this way.





# 6 THE DEMO COMMUNITY AND GOOD MANNERS

SATU “MY” HAAPAKOSKI

## The demo community

The modern demoscene is a diverse community. The demoscene is living culture that develops together with the society surrounding it.

The community includes people from very different professional and educational backgrounds. Many members work in ICT, but the scene also includes experts from other fields. The demoscene has also become an important community to many minorities. The scene has a lot of neurodivergent people and members of sexual minorities, for example.

One of the key characteristics of the demoscene is trust among the hobbyists. The demoscene is a close-knit community with a strong sense of mutual trust. If you behave inappropriately, word will spread quickly in a small community.

Taking others into account and learning how to work in a group is important in the demoscene. Diversity is seen as an asset, and demo groups may give rise to long and meaningful friendships.

## Principles of a safer space

The principles of a safer space are important for many demoscene events. These principles involve respecting others and accepting diversity. It is important to understand that your activities will affect other people, even if your intentions are good. Respecting the opinions of others and avoiding assumptions is key. It is also important to consider people's physical and mental boundaries and to intervene in case of inappropriate behaviour. Each member is responsible for their own actions and behaviour, and they need to be ready to improve.

## Demo groups and working together

The demoscene has several groups of people, known simply as demo groups. These may be groups creating content for Amiga/Atari, groups with a specific style or groups built around a group of friends, for example. The groups often have their own symbols, such as logos. They are placed in demos and they may also be used to create stickers and banners. There may be competition between the groups – these days, the competition is mostly very friendly. The groups also appreciate each other, which is commonly shown by including greetings to other groups in the demos.

Working in a group in the demo community means that the members specialise in different areas. Everyone does what feels comfortable and natural to them. It is quite common that not all members participate in every project the demo group undertakes. Groups may also contain subgroups that have only some of the members.

Demos are usually released under the group's name, and the credits list the persons who created parts of the production. What each individual did is also often separately indicated. Demos usually follow the group's style/visual appearance and use the tools, such as demo engines and platforms, that the group is most familiar with.

## Copyright and licences

Authors always have the copyright to their own work. If the authors so desire, they may give permission to display, use, publish or edit the work. Copyright expires when 70 years have passed since the author's death. More information on Finnish copyright law: [www.finlex.fi](http://www.finlex.fi)

Licences allow copyright holders to define how the work may be used and in what ways it may be shared and edited. It is important to examine which licences cover the images and music you want to use in your own works. If a licence is not clearly indicated, it is safe to assume that the author has not handed over the rights to use the work. Common licences include Copyright and Creative Commons (CC), for example. The CCO licence gives permission for the free editing, use and distribution of the work.

It is good to openly communicate where the work comes from and who the original author was. In addition, you should openly explain

which tools were used and how. Being open may even generate added value for your demo or other work.

Copyright legislation and practices may differ between countries and events. If you are unsure, you can ask the organisers what their attitude is and what should be considered in particular.



Further information on licences: <https://creativecommons.org/>

Further information on copyright:  
<https://tekijanoikeus.fi/tekijanoikeus>

## Demo parties

Demo parties provide the community with a forum for showcasing demos, sharing information and networking with others. These events commonly have competitions – compos – where demos and other other productions are assessed in different categories. Compos are an interesting way to challenge yourself, showcase your expertise and participate in the operation of the community.

Demo parties commonly last between one and four days, and they may be local, national or international. Depending on the nature of the event, you can participate in workshops and listen to lectures or musical performances. Events are an excellent place to meet other hobbyists and learn new things.

If you are interested in the demoscene and want to develop in creating demos, taking part in a demo party is an excellent way to join the community. Finnish demo parties include Instanssi in Jyväskylä, Zoo in Orivesi, Graffathon in Espoo and Alternative Party and Assembly in Helsinki, for example. Remember to read the guidelines and rules for the event in good time!

## AUTHORS

### Demoscene experts

Markku “Marq” Reunanen

Tommi “Electric” Musturi

Jonne “Purple Motion” Valtonen

rimina

Mika “Waffle” Rautio

Satu “Myy” Haapakoski

### MuseoX

Eljas Suvanto (The Finnish Museum of Games)

Niklas Nylund (The Finnish Museum of Games)

Outi Penninkangas (The Finnish Museum of Games)

Olli Nordling (The Finnish Postal Museum)

### Additional thanks to

Tuomas “Mayor” Nieminen

Jukka “Grendel” Kauppinen

Paavo “qma” Nieminen

### Translations

Mikko Heinonen

### Sources and links

<https://wiki.aineetonkulttuuriperinto.fi/wiki/Demoskene>

<https://www.vapriikki.fi/pelimuseo/>

<https://museox.fi/>

<https://museovirasto.fi/>

<https://www.pouet.net/>

<http://www.kameli.net/demoresearch2/>

<https://demozoo.org/>

<https://csdb.dk/>

<https://www.demoparty.net/>

<https://www.graffathon.fi/>

<https://assembly.org/en>

<https://www.zooparty.org/>

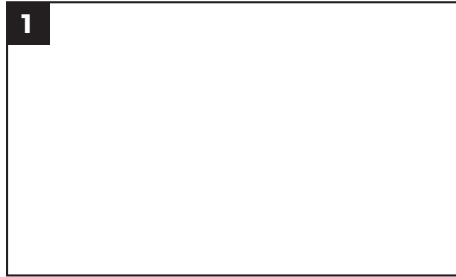
<https://scenestream.net/demovibes/>

<https://demoscene-the-art-of-coding.net/>

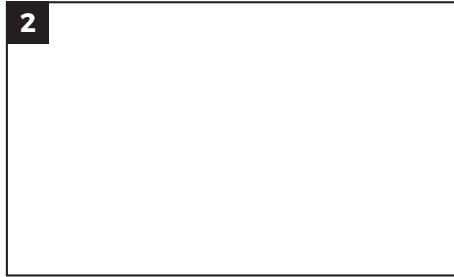
# TEMPLATE FOR CONCEPTUALISATION

STAGES	DESIGN SPACE
1. Working title or final title of demo:	<ul style="list-style-type: none"> <li>· What is the main idea of your demo?</li> <li>· What is the emotion or message you want to convey to the audience?</li> <li>· Does the demo have a specific topic or theme you want to focus on?</li> </ul>
2. Name of demo group:	<ul style="list-style-type: none"> <li>· What is the name of your demo group? Why did you choose it?</li> <li>· Does the name of your demo group refer to something?</li> </ul>
3. Members:	<ul style="list-style-type: none"> <li>· Who are the members of your demo group?</li> <li>· What are their roles and areas of responsibility?</li> <li>· What are the strengths of your group?</li> <li>· Is your group lacking some special expertise?</li> </ul>
4. Plan:	<ul style="list-style-type: none"> <li>· What is the plot or story of your demo?</li> <li>· What is the structure and course of your demo?</li> <li>· Does your demo contain surprises or twists?</li> </ul>
5. Visual style:	<ul style="list-style-type: none"> <li>· What sort of visual appearance are you aiming for? Does your demo represent a specific style?</li> <li>· What kinds of colours, shapes or effects would you like to use?</li> <li>· How would your demo stand out?</li> </ul>
6. Musical style:	<ul style="list-style-type: none"> <li>· Which music styles do you want to use?</li> <li>· Which instruments, sounds or rhythms do you want to emphasise?</li> <li>· How do the demo's sounds and visuals fit together?</li> </ul>
7. Technical details:	<ul style="list-style-type: none"> <li>· Which software and hardware are you going to use?</li> <li>· Will you be using programming languages?</li> </ul>
8. Implementation and schedule:	<ul style="list-style-type: none"> <li>· Which kinds of challenges do you expect to encounter as part of the demo process?</li> <li>· What are the most important milestones and deadlines for your demo?</li> <li>· How do you make sure that the demo is completed on time?</li> <li>· What is the exact division of labour among the members?</li> </ul>

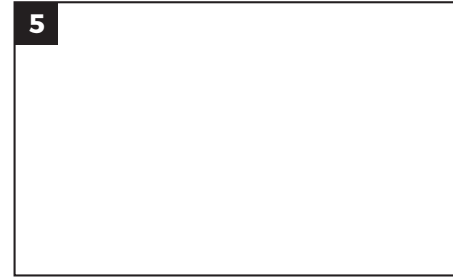
# STORYBOARD



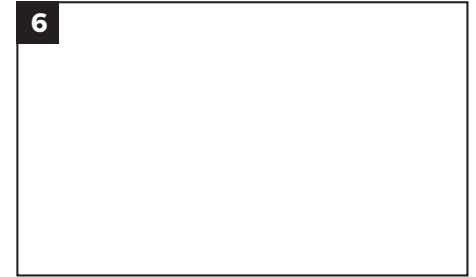
Scene:



Scene:



Scene:



Scene:



Scene:



Scene:



Scene:



Scene:





Photo: Saarni Säilynoja. Vapriikki photo archives