

The 7 GREAT INVENTIONS | OF THE | *Modern* INDUSTRIAL AGE

Step back into an era of unprecedented human innovation

MUSIC OF SALLY GREENAWAY

— FEATURING —

SYZYGY ENSEMBLE & DAN RICHARDSON

The truly great inventions change us.

— People and society. —

The way we do things and the way we think.

The

7 GREAT INVENTIONS

— OF THE —



INDUSTRIAL AGE

MUSIC COMPOSED BY **SALLY GREENAWAY**
FEATURING **SYZYGY ENSEMBLE** AND
GUEST PERCUSSIONIST **DAN RICHARDSON**

Humanity has always sought to extend the boundaries of knowledge through

innovation & discovery

Yet, just over a hundred years ago there was no space travel, bionic ear, cinema, telephone network... or atomic bomb.

The innovation of the 20th Century created opportunities like never before.

And it changed us.

1	INVENTION REINVENTION	3'04
2	TELECOMMUNICATIONS	2'30
3	AVIATION & THE SPACE FRONTIER	3'36
4	THE AGE OF CONVENIENCE	3'15
5	THE MECHANICAL BRAIN	3'22
6	AND SO BEGINS MASSED WORLD WARFARE	6'08
7	POSTLUDE: HYMN TO FREEDOM	2'47
8	MIRACLES OF MODERN MEDICINE	4'01
9	THE ADVENT OF CINEMA	5'36
10	FINALE: 7 GREAT INVENTIONS	2'30



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Music composed by Sally Greenaway. sallygreenaway.com.au

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sallygreenaway.com.au

90% —OF— HUMANITY'S TOTAL BODY OF KNOWLEDGE & material values developed during —THE 20th CENTURY

120 GENERATIONS HAVE KNOWN AND USED THE WHEEL

40 GENERATIONS HAVE USED WINDMILLS & WATERMILLS

20 GENERATIONS HAVE KNOWN AND USED TIME PIECES

10 GENERATIONS HAVE KNOWN PRINTING

5 GENERATIONS HAVE TRAVELLED WITH SHIPS & TRAINS

4 GENERATIONS HAVE USED ELECTRIC LIGHTS

3 GENERATIONS HAVE TRAVELLED WITH AUTOMOBILES,
USED TELEPHONES & VACUUM CLEANERS

2 GENERATIONS HAVE TRAVELLED WITH AIRCRAFT AND
USED RADIOS & REFRIGERATORS

ONLY TODAY'S GENERATION

have travelled in outer space, used atomic energy,
PCs and Notebooks and artificial satellites to
transmit audio, video and other information

around THE globe

Source: Orloff, Michael A. Inventive Thinking through TRIZ: A Practical Guide.

Awards

APRA Art Music Award 2017:
Instrumental Work of the Year (State Award)

Canberra Critics Circle Award Winner 2017

Background & Development

This recording presents the key musical movements from Greenaway's hour long dramatic music work, *The 7 Great Inventions of the Modern Industrial Age*. The full production is an immersive and interactive story that involves 6 musicians supported by an actress (or actor), archival audio, sound fx, lighting and set design featuring over 100 artefacts from the 20th Century.

Greenaway collaborated with Australian writing duo Magenius (Paul Bissett and Catherine Prosser), who wrote the whimsical script that sets up the musical elements and ties all the movements together.

During the composition process, Greenaway emphasised the development of atmosphere and narrative, which was drawn from the stories and experiences of the 90+ year olds she met with. She also spoke with archivists and scientists to bring further authenticity to the work.

The 7 Great Inventions of the Modern Industrial Age was conceived thanks to philanthropic support by the Merlyn Myer Fund in conjunction with Melbourne Recital Centre. The work was commissioned in 2015 and premiered at Melbourne Recital Centre in 2016. Subsequent performances include a sold-out season in Canberra in 2017.

Education resources for this work are available from the composer and the Australian Music Centre.

Thank you to Martin at Move Records, Laila Engle and Syzygy Ensemble, Dan Richardson, and the many generous Pozible campaign supporters for making this recording possible.

THE 7 GREAT INVENTIONS

OF THE

MODERN INDUSTRIAL AGE

explores the astounding
surge in human invention
during the 20th Century.

And its consequences.

“Greenaway imaginatively weaves her original music score with specially researched audio sourced from archive collections around the world, bringing to life the wonder of an age of unprecedented innovation.”

- Canberra Times

Invention Reinvention 01

What would Bach's 2-part invention in F Major sound like if it were written in the ragtime piano era of the early 20th Century? Be transported to a bygone time, to the dawn of a major new age of human activity and entrepreneurship.

Telecommunications 02

Opening with a grand 'Greatest Show on Earth' musical gesture, a radio band sweep interrupts proceedings: now a Gershwin-inspired tin pan alley mood fills the airwaves. We are reminded of telephone exchange ladies who connected our calls, satellite technology (Sputnik and beyond) beaming television and mobile phone signals around the globe, and what it's like when the TV aerial doesn't receive a good signal!

Aviation & the Space Frontier 03

A NASA rocket launches - the piano takes off with a rocketing arpeggio passage, accompanied by scalic bursts from the woodwinds. Eventually we find ourselves floating in space. The music sparkles with glinting stars and distant asteroid belts. Now the rush of wind and excitement takes hold - what must pilots have felt when they first took off in the early open air planes? After such a joyous and wondrous time, the music suddenly plummets and we are reminded of the fated Apollo 13 transmission... The final moment of the piece floats off into space.

“Houston, we have a problem...”

The Age of Convenience 04

Now we enter the advertising realm. Vintage adverts bustle into jolly Bakelite-smiley jingles that speak of our hunger for more convenience. This fabricated positivity unravels as we become bombarded with more and more adverts, and the music darkens and twists into the throngs of unease. An indigestion tablet

will save the day! And of course a tongue-in-cheek jingle reminds us:

“If you want simple and fun and quick,
you need the Age of Convenience!”

The Mechanical Brain 05

With a flick of a switch we are teleported to a world of vacuum tubes, logic boards and electrical relays: the dawn of electro-mechanical artificial intelligence. The music pulses and hums, mirroring electrical current. The piano chords ping at specifically determined rhythmic calculations, inspired by the letters from the ENIGMA code (for sending encrypted messages during WW2). The binary dynamic markings produce contrasting, structured, frenetic activity, signifying the computational noises of the Bombe decryption device - the world's first digital computer.

And So Begins Massed World Warfare 06

Juxtaposing 1960s modernist compositional techniques with a partita inspired by Bach, we are thrust into a world without meter or key signature and the musicians are tasked with playing non-conventionally against each other, creating a feeling of destruction and chaos. Symbolic of all the wars from the 20th Century, where mass munitions and mechanization of war was a major feature, it is hard not to think of prisoners of war when the alto flute enters with its haunting and gut-wrenching melody. The piece battles to a climax, with an air raid siren warning us of the horrors of aerial bombs, leading to catastrophic stillness (and background ringing in our ears from the piano sustain pedal).

Postlude: Hymn to Freedom 07

But from war comes the potential for the great power of humanity. One by one small voices join in humming a stunningly uncomplicated melody - it could be a folksong. Eventually the piano joins and its harmony

breathes a deep despair and hope into our being: we as the human race need to work together to bring peace.

Miracles of Modern Medicine 08

Treading a tight-rope between wondrous awe and the macabre, the music illustrates and interweaves with archival audio detailing the many medical advances that have been achieved during the 20th Century. With a particular focus on Australian innovations, we hear of the development of penicillin into the world's first antibiotic, the iron lung for polio sufferers, and the cochlear implant - and what it was like for Dr Clarke to achieve his dream of bringing sound to those who suffer from hearing loss and deafness.

“When we stimulated different electrodes
in his inner ear, he heard a vowel sound and
that put the clue together...”

The Advent of Cinema 09

Recreating the sounds of the cinematic age, the piece waltzes with atmospheric, dark undertones. The wonderful cello and clarinet moments eventually build into a raucous dance with chromatic runs from the flute, before dying away to a beautifully alluring and introspective piano finish.

“Mastery of light and sound allowed us to
project humanity onto the silver screen,
captured for generations to come.”

Finale: 7 Great Inventions 10

This finale brings the return of several of the musical themes from each of the pieces in the suite together in a medley or overture. It reminds us of the journey we have taken, and bookends nicely with the final bars scored for solo ragtime piano.



Sally Greenaway

“Greenaway’s compositions are as imaginative and emotively alluring as the wonder of an age of unprecedented innovation.”

- Canberra Times

Sally Greenaway (b. 1984) is an award-winning Australian composer and freelance pianist, educator and musical director based in the ACT.

She works in a very diverse range of musical circles, from our country’s most prestigious orchestras, chamber groups and soloists, to Canberra’s local schools and community music scenes.

She produces work that explores jazz, classical and film music contexts (and beyond).

sallygreenaway.com.au

SYZYGY Ensemble

“Their musicianship is unparalleled...”

- Canberra Times

Syzygy Ensemble is one of Australia’s finest 'new music' ensembles, lauded for their virtuosic precision, innovative programming and ability to connect viscerally with their audiences.

The musicians of Syzygy Ensemble share a deep empathy with music of our own time as well as an unbridled desire to share this enthusiasm with audiences, taking them on a journey into the world of living composers and their music, which speaks to all of us with relevance to our time.

Since winning first prize in the chamber music section of the Australian Concerto and Vocal competition in 2010, Syzygy has gone on to tour, perform, mentor and educate all around the country, unearthing the best and most exciting music of the 20th-21st centuries.

syzygyensemble.com

“Spectacular leaps
forward in transport
defy the imagination.
Advances in medicine
verge on the fantastic.
Communication
technology - once
Science Fiction, now in
every home -
AMAZING,
EXHILARATING,
ASTOUNDING!”



The **7** GREAT INVENTIONS OF THE *Modern* INDUSTRIAL AGE

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The 7 GREAT INVENTIONS OF THE Modern INDUSTRIAL AGE

Humanity has always sought to extend the boundaries of knowledge through innovation and discovery. Yet, just over a hundred years ago there was no space travel, bionic ear, cinema, telephone network... or atomic bomb. The innovation of the 20th century created opportunities and choices like never before. And it changed us.

Composer Sally Greenaway and Syzygy Ensemble take you on a provoking and entertaining journey through 7 innovations that continue to shape humanity, the way we behave and the way we think.

TELECOMMUNICATIONS



1900s
More than 30,000 telephone services operating via manual switchboard in Australia.



1920s
Launch of public radio broadcasting in Australia.



1950s
Major infrastructure upgrades brings automated exchange dialing to 98% of Australia.



1960s
First global communications satellites launched.



1975
Colour television launched in Australia.



1980s
First mobile phones become commercially available.



1990s
Wifi developed and the Internet goes global.

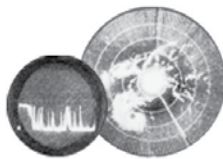
AVIATION & SPACE FRONTIER



1900s
Man achieves flight and develops the first motorised planes.



1930s
Engine advances and the development of pressurised fuselages for passenger comfort enable international passenger airline services to begin spanning the globe.



1940s
Introduction of radar improves air route navigation, safety and accuracy.



1960s
Man reaches for the stars! Yuri Gagarin is the first person to orbit the earth and Edwin 'Buzz' Aldrin and Neil Armstrong are the first two people to land on the moon.



1970s
The world's largest passenger 'Jumbo Jet' airliner (Boeing 747) democratises air travel, resulting in affordable long-haul air travel for the masses.



late 1970s
Concorde brings new level of luxury and speed to passenger air travel, travelling at 2x the speed of sound.



1980s
Launch of the space shuttle missions, which forwarded scientific research and development.

AGE OF CONVENIENCE



1900s
The first motorised suction sweepers are developed for the domestic market.



1910s
Instant powdered coffee invented.



1920s
The electric toaster, which could brown the bread on both sides at the same time, becomes available to consumers.



1930s
First electric hairdryers begin to appear in salons worldwide.



1940s
Domestic automatic washing machine invented.



1950s
Victoria rotary lawnmowers become must-haves for Australian home owners.



1960s
Glad wrap helps thousands of Australians cover their hors d'oeuvres before guests arrive.



1970s
The roll-out of hundreds of ATMs around the country allows Australians to access their money outside of their bank's working hours.



1980s
Microwaves become home necessities, driving a range of 'ready meal' product lines.

MECHANICAL BRAIN



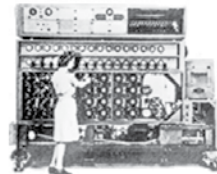
1900s
First 'incomparable cashiers' (mechanical cash registers).



1920s
Punch cards allow early computing machines to perform computational processing tasks previously performed by manual calculation.



1930s
Vacuum tubes facilitate the development of the first electronic computers.



1940s
First programmable electronic digital computers performed calculations to assist with cryptography (such as deciphering the Nazi Enigma codes) and solve complex mathematical problems.



1950s
Development of the transistor revolutionises the field of electronics, paving the way for smaller, more reliable and cheaper computers.



1970s
Debut of the Xerox Alto computer, revolutionising the way people interacted with computers. It had a graphical user interface, mouse, applications (including graphics editor and word processing), local area networking and printing capabilities.



1980s
With the rise of microchips and the microprocessor, desktop computers were able to be mass produced for the domestic market, complete with VGA monitors and 3.5" floppy disk drives.



1990s
Market boom for laptops, which utilised early LCD technology for their flat screens, making computers truly portable.

MASSED WORLD WARFARE



1900s
Diesel-electric submarine developed.



mid 1910s
Development of the gas mask in reaction to poison gas warfare (first use of chemical weapons).



1920s
Air tubas (acoustic locators) developed to aid in hearing opponent military activities (prior to the advent of radar).



late 1930s
During WWII there was a concerted effort to develop mechanised infantry - mass munitions manufacturing reached unprecedented levels.



mid 1940s
Advancements in nuclear technology causes the world's first nuclear arms race.



1960s
Night vision technology improves dramatically during the Vietnam War period.



late 1970s
The development of Kevlar aids in protective body armour. It has since been used in a wide variety of applications, including bicycle tyres and drumheads.



late 1980s
Advancements in stealth technology brings the advent of the Stealth Bomber aircraft, ships, submarines, missiles and satellites.



1990s
World powers agree to the Chemical Weapons Convention proposed by the UN Conference on Disarmament.

MIRACLES OF MODERN MEDICINE



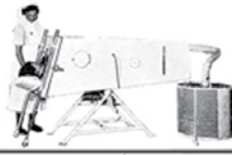
1900s
Hospital departments around the world begin using roentgen rays (x-rays) for diagnosis, surgical planning and follow-up.



1910s
Discovery of water-soluble heparin, an anticoagulant.



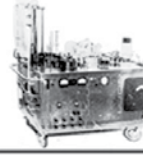
late 1920s
Pre-dawn of the modern antibiotic age, with the discovery of penicillin. Australian Howard Florey would be the first to use the drug in clinical trials in the 1940s.



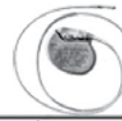
late 1930s
Edward Both develops an affordable and portable cabinet respirator (iron lung) in response to Australia's polio epidemic.



1940s
Early successful hip replacements using metal prostheses paves the way for modern hip replacement surgery.



1950s
Development of the heart-lung machine revolutionises heart surgery by giving doctors enough time to perform the life-saving operations.



late 1950s
Dawn of the implantable artificial pacemaker.



1960s
Major world wide polio vaccinations help to eventually eradicate the disease from several countries.



late 1960s
First total artificial heart used successfully as a bridge to transplantation.



1980s
Dawn of the modern cochlear implant, which used multiple channels to enhance spectral perception and speech recognition.

ADVENT OF CINEMA



1900s
World's first feature length multi-reel film made in Australia: 'The Kelly Gang'.



1910s
Edison's Kinetograph, which was an early attempt to synchronise sound and picture, becomes a popular public sideshow exhibit.



late 1910s
Charlie Chaplin becomes the world's first 'film star' and cultural icon.



1920s
Advent of the clapper board to assist with synchronising picture and sound. Optical sound on film technologies were being developed, launching the era of 'Talkies'.



1930s
Dye-based 3-colour processing systems developed.



1950s
Hollywood brings early 3D and widescreen technologies to theatres across the globe.



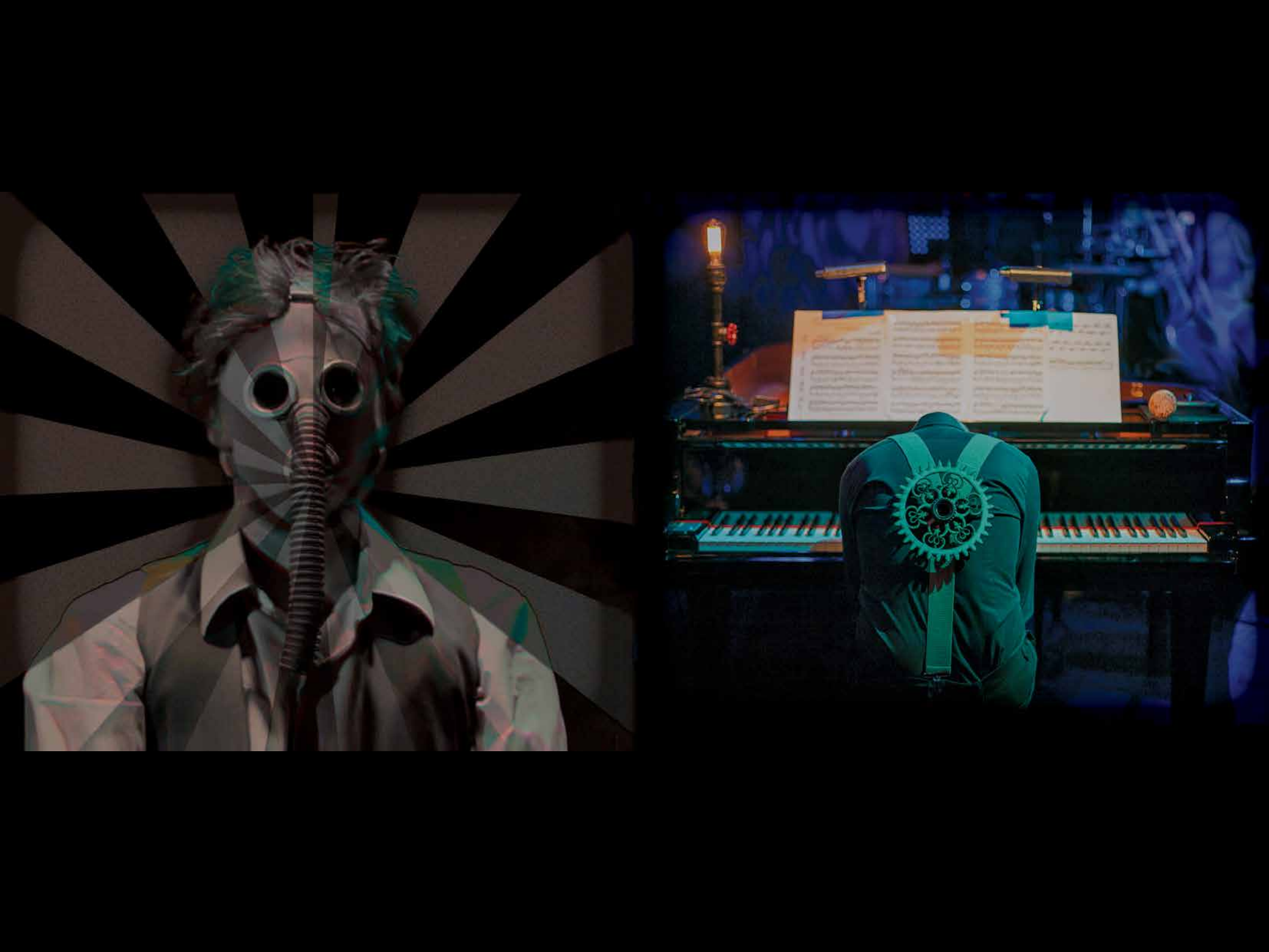
mid 1950s
Popularity for drive-in cinemas takes Australia by storm.



1970s
Advent of IMAX, the blockbuster and the debut of computer-generated 3D special effects.



1980s
THX and Dolby bring a standard quality assurance system to the film and cinema industries.





FLUTES LAILA ENGLE
 VIOLIN JENNY KHAFAGI
 PIANO LEIGH HARROLD
 CELLO CAMPBELL BANKS
 CLARINETS ROBIN HENRY
 PERCUSSION DAN RICHARDSON

COMPOSER & PRODUCER SALLY GREENAWAY

RECORDED NOV 2017, MOVE RECORDS, MELBOURNE
 ENGINEER MARTIN WRIGHT

DESIGN SALLY GREENAWAY
 PHOTOS NOVEL PHOTOGRAPHIC

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