Past, Present, and Future of Storyboarding in Japanese Animation

Jun Kato, Ryotaro Mihara, Nao Hirasawa (Arch Inc.)

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ARCH | Research https://research.archinc.jp/en

Introduction

Past, Present, and Future of Storyboarding in Japanese Animation

Who are we?

Jun Kato (presenter)

Technical Advisor at Arch Inc.
Senior Researcher at AIST

Background: Computer Science / Human-Computer Interaction

Ryotaro Mihara

Global Business Advisor at Arch Inc.
Associate Professor at Keio University

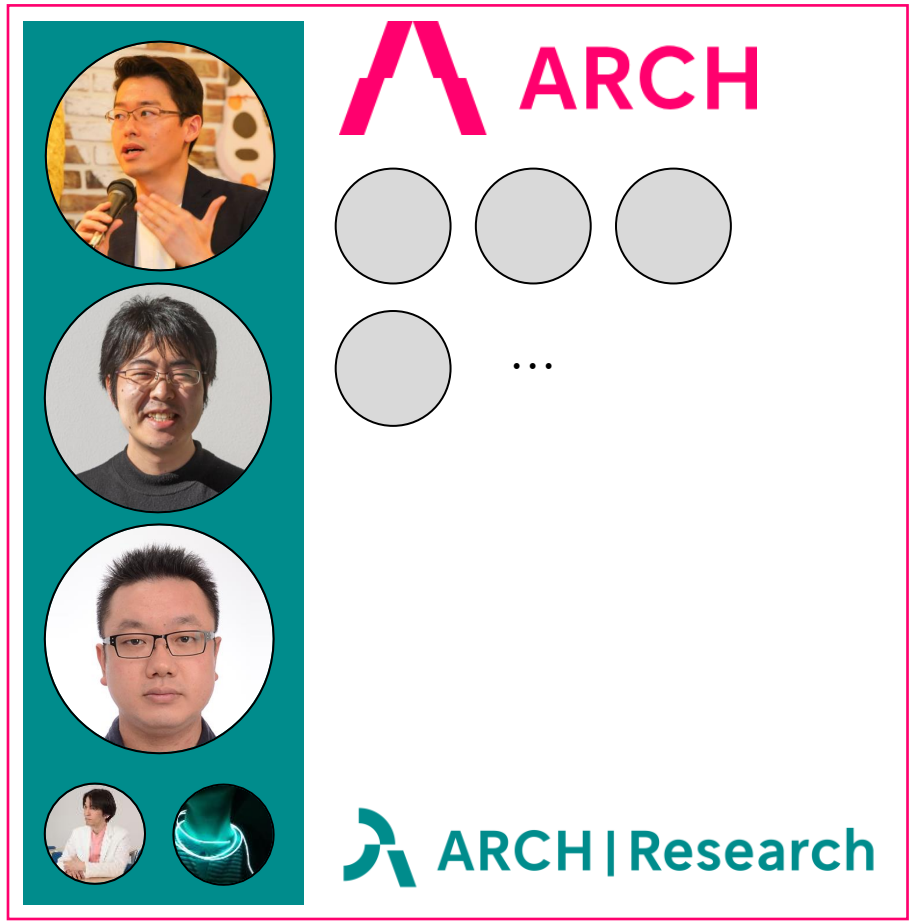
Background: Cultural Anthropology

Nao Hirasawa

Founder, CEO at Arch Inc.
President at Graphinica, Inc.

Expertise: Anime Production

Who are we?



- **Arch** is a Japanese animation production company without in-house studios (focus on helping production studios and creators)
- **Arch Research** is a small R&D team in Arch, with academic researchers at its core

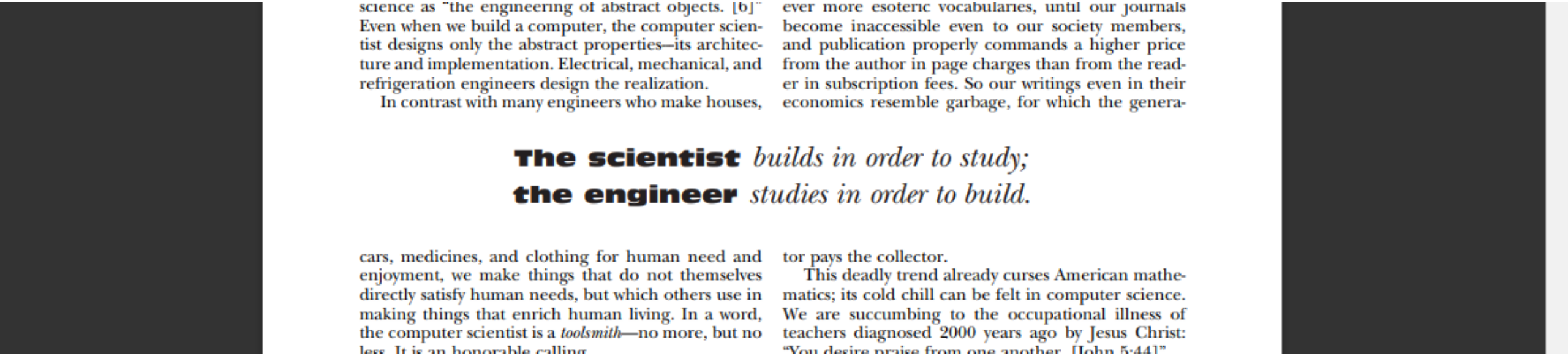
Our research question

Many studies of animation begin with a question about the object—**what is anime?**—but I suggest a different entry point: **Who makes anime?**

Ian Condry, “The Soul of Anime,” p.3

We pose yet another entry point—our research began with exploring the design space of building creativity support tools for anime production studios, which can be summarized as: **how to make anime?**

Creativity support tools?



science as "the engineering of abstract objects. [6]" Even when we build a computer, the computer scientist designs only the abstract properties—its architecture and implementation. Electrical, mechanical, and refrigeration engineers design the realization.

In contrast with many engineers who make houses, cars, medicines, and clothing for human need and enjoyment, we make things that do not themselves directly satisfy human needs, but which others use in making things that enrich human living. In a word, the computer scientist is a *toolsmith*—no more, but no less. It is an honorable calling.

ever more esoteric vocabularies, until our journals become inaccessible even to our society members, and publication properly commands a higher price from the author in page charges than from the reader in subscription fees. So our writings even in their economics resemble garbage, for which the generator pays the collector.

This deadly trend already curses American mathematics; its cold chill can be felt in computer science. We are succumbing to the occupational illness of teachers diagnosed 2000 years ago by Jesus Christ: "You desire praise from one another. [John 5:44]"

The scientist *builds in order to study;*
the engineer *studies in order to build.*

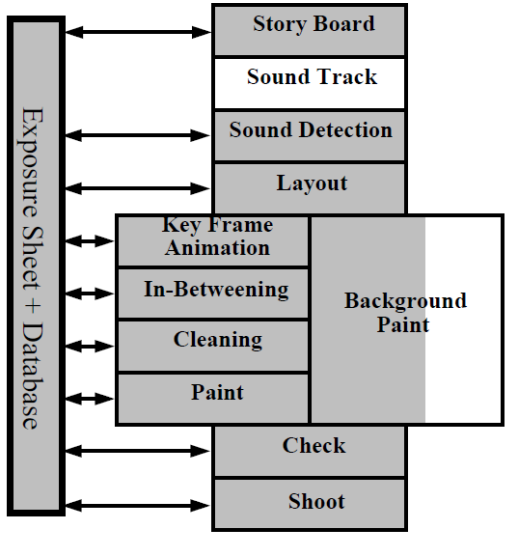
- Fred Brooks. '96. "**The Computer Scientist as Toolsmith** II." CACM Vol.39 (3), 61-68.
- Ben Shneiderman. '09. "Creativity Support Tools: **A Grand Challenge** for HCI Researchers." In Engineering the User Interface. Springer, London, 1-9.
- Jonas Frich et al. '18. "Twenty Years of Creativity Research in **Human-Computer Interaction**: Current State and Future Directions." In Proc. ACM DIS 2018, 1235-1257.

An example from Jun's prior work (affiliated with AIST): TextAlive

- A web-based tool for creating kinetic typography videos
- Designed for music video creators and programmers

Jun Kato et al., "TextAlive: An Integrated Design Environment for Kinetic Typography," In Proc. ACM CHI '15, 3403-3412

An example of successful tech transfer:
TicTacToon ➡ Toon Boom Technologies



(c) The TicTacToon Process

Figure 1: Work flow of the different stages in animation Work done on computers is marked with a dark background

Jean-Daniel Fekete et al., "TicTacToon: A Paperless System for Professional 2D Animation," In Proc. ACM SIGGRAPH '95, 79-90

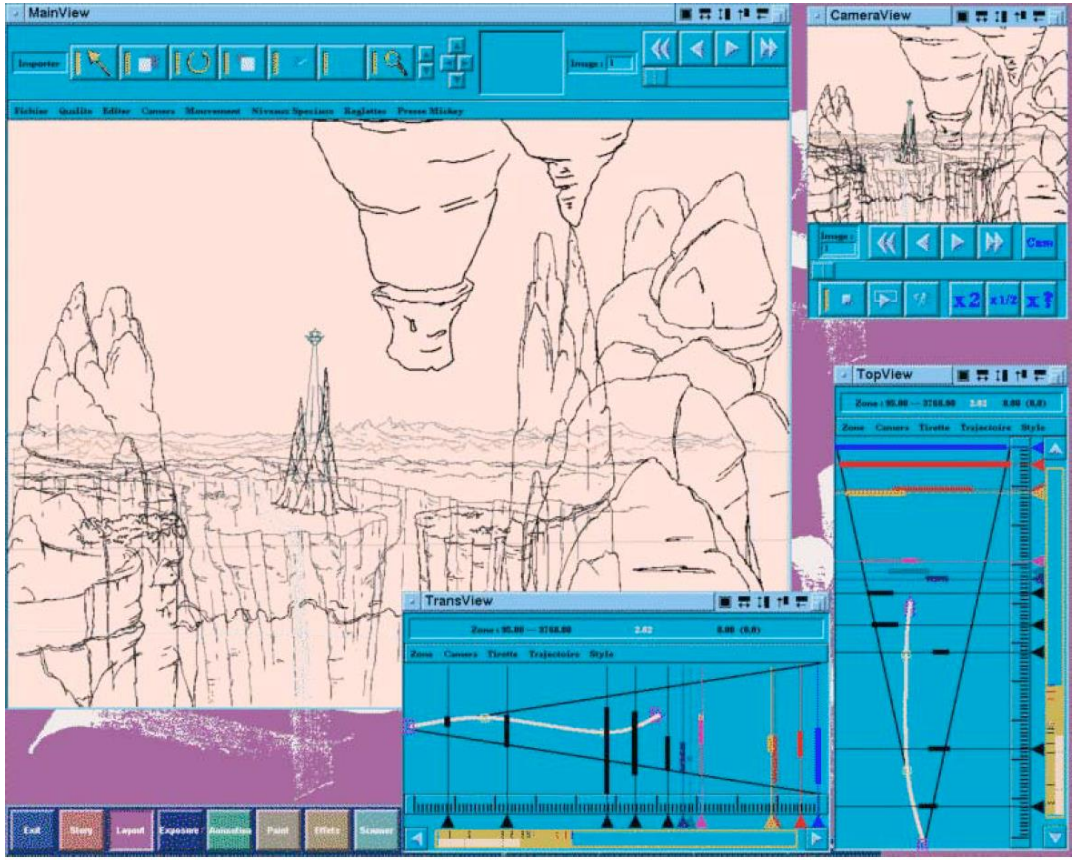


Figure 8: The Layout module showing a front view, top view and side view of a scene.

But, before that (tech transfer)...

Our work aims at

1. Understanding the present of anime storyboarding
2. Understanding the past
3. Building software for the better future

Methodology: literature review + participatory design
Collaborators

Kazuya Murata

Anime Director

With background in industrial design, learned direction in **Studio Ghibli** (participated in "**Only Yesterday**," "**Ocean Waves**," ...), contributed to the foundation of and worked for **OLM, Inc.**, and became self-employed; Participated in "**PLANETES**" (storyboard), "**Eureka Seven**" (storyboard), "**Code Geass: Lelouch of the Rebellion**" (associate director), and directed the animated film for the first time in "**Fullmetal Alchemist: The Sacred Star of Milos**." Later, participated in numerous animations including "**Gargantia on the Verdurous Planet**" (original concept, director), "**Kado: The Right Answer**" (chief director), "**A.I.C.O. – Incarnation –**" (only on Netflix; original concept, director), and "**Starlight Promises**" (published on YouTube; original concept, director).

Yokohama Animation Laboratory

Anime Production Studio

Founded in 2015, YAL is led by Yuma Oue who served as a producer of "**Gargantia on the Verdurous Planet,**" "**Monster Strike 2**," and so on.

From Disney to Anime: past of anime storyboarding

Past, Present, and Future of Storyboarding in Japanese Animation

Storyboarding at Disney
in late 1920s and 1930s

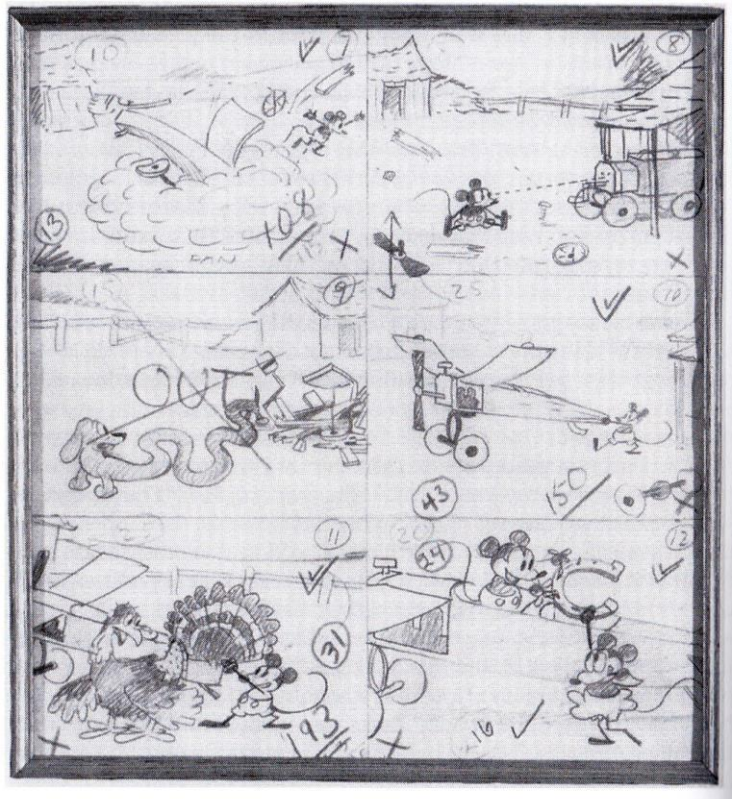


Figure 2.1 A series of story sketches detailing a scene from *Plane Crazy* (1928). Image provided courtesy of The Walt Disney Company (TWDC would like to make clear that they cannot confirm the red pencil markings, reproduced here in black and white, were made by Disney artists)

… **the six-panelled page** variety with separate written notes, and **the three-panelled page**, which incorporated the written notes alongside the vertically arranged sketches.

Chris Pallant and Steven Price, “Storyboarding: A Critical History,” p.50

Storyboarding at Disney
in late 1920s and 1930s

Figure 2.2 A promotional still, c.1933, showing a staged story planning session for *The Grasshopper and the Ants* (1934), featuring Webb Smith seated far left and Walt Disney in the centre. Image provided courtesy of The Walt Disney Company.

While **the roughly A4-sized, six-panelled page storyboard layout** remained in use at Disney, **the larger, cork-mounted variety** became the dominant pre-production storyboard arrangement.

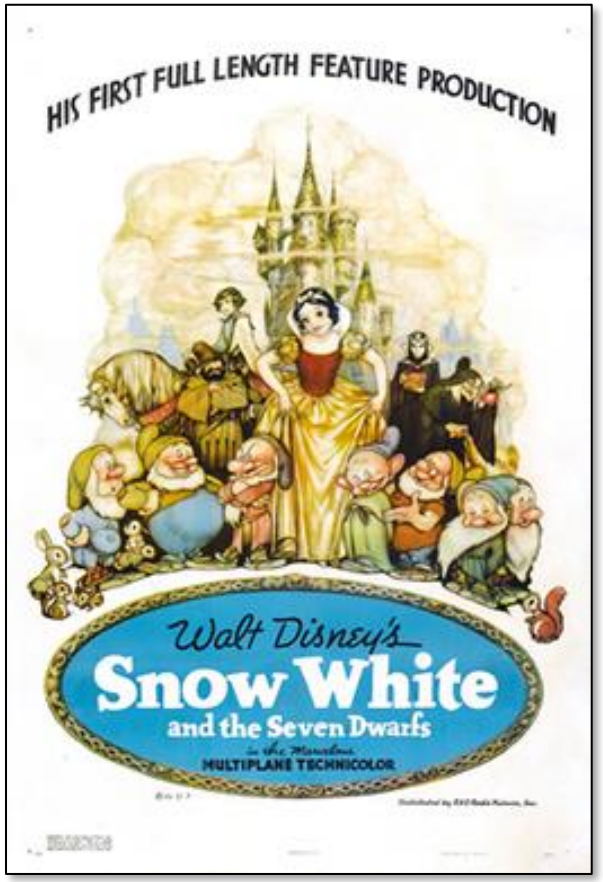
Chris Pallant and Steven Price, "Storyboarding: A Critical History," p.53

Snow White and the Seven Dwarfs
made with the established storyboarding method

- The first full-length animated film
  - released in **1937** in the United States
  - translated and released in **Sep 1950** in Japan
- The time gap was caused by WW II
  - following up the US releases resulted in a packed schedule
  - Japan release dates: Bambi (**May 1951**), Cinderella (**Mar 1952**), Pinocchio (**May 1952**), Alice in Wonderland (**Aug 1953**), Dumbo (**Mar 1954**), Fantasia (**Sep 1955**)

Yusuke Nakagawa, “Anime Taikoku Kenkokuki 1963-1973”

Theatrical release poster retrieved from Wikipedia



Disney's impact

Disney films became popular in Japan and motivated key persons to make animations:

1. Hiroshi Okawa (Toei, established in Apr 1951)
2. Ryuichi Yokoyama (Otogi Production, established in Jan 1955)
3. Osamu Tezuka (Mushi Production, established in 1961)

Yusuke Nakagawa, "Anime Taikoku Kenkokuki 1963-1973"

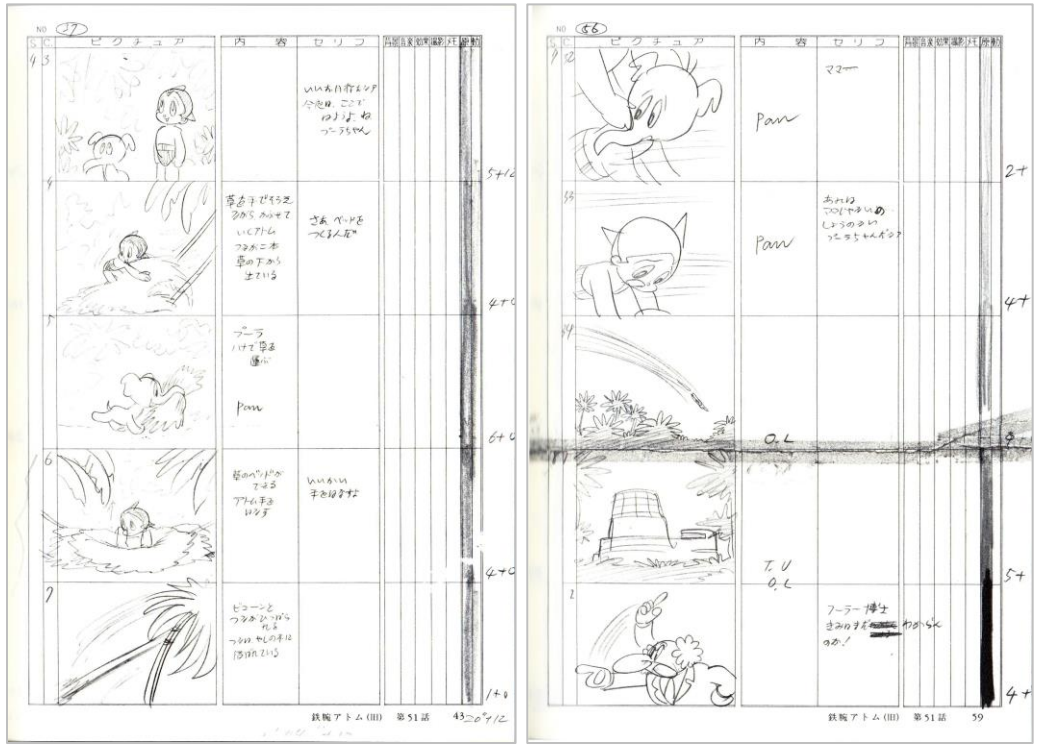
Disney's impact:
Hiroshi Okawa (Toei and Toei Douga)

- **visited United States and Europe in 1953**
- distributed the first animated Japanese color film "Ukare Violin" in Oct 1955, produced by Nihon Douga
- bought Nihon Douga and established Toei Douga in Aug 1956
- produced **"Hakujaden," the first full-length animated Japanese film** in Oct 1958

[Image] NHK, https://www3.nhk.or.jp/news/special/sci_cul/2019/10/news/news_191026/

Yusuke Nakagawa, "Anime Taikoku Kenkokuki 1963-1973"

Disney's impact
Ryuichi Yokoyama and Osamu Tezuka



- **Ryuichi Yokoyama**
  - **visited United States in 1951, visited Disney, and met Walt Disney**
  - Established Otogi Production in Jan 1955
  - produced "Onbu Obake" in Dec 1955 and invited Tezuka to its preview, suggested him to create animations
- **Osamu Tezuka**
  - worked for several Toei anime films and established Mushi Production in 1961
  - **produced "Astro Boy," the first animated Japanese television series**

[Images] Astro Boy E-Conte – Tezuka Osamu, "Tezuka Osamu E-Conte Taizen (1) Tetsuwan Atom," p.43 and p.59

Yusuke Nakagawa, "Anime Taikoku Kenkokuki 1963-1973"

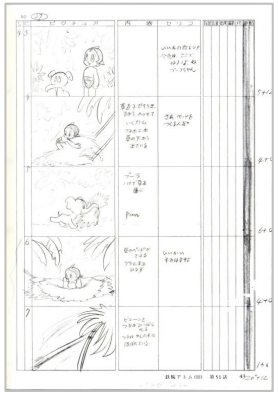
From Disney to Anime

The storyboarding method was (somehow) imported and Japanese E-Conte format became almost identical to the date by the end of the 1950s.

Q. what was NOT imported?

Hakujaden

Astro Boy

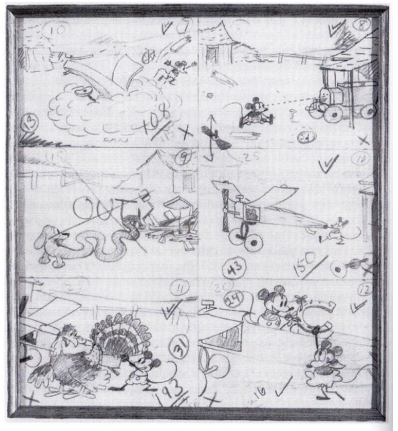


Another example of E-Conte in the early days, “Space Ace” on-air in 1965, produced by Tatsunoko Production.

Each panel has a unique rounded shape to accommodate the distortion caused by the flat tube TVs.

[Image] Seiji Okuda, “Anime no Shigoto wa Omoshiro Sugiru,” p.38

Missing feature in E-Conte: collaborations



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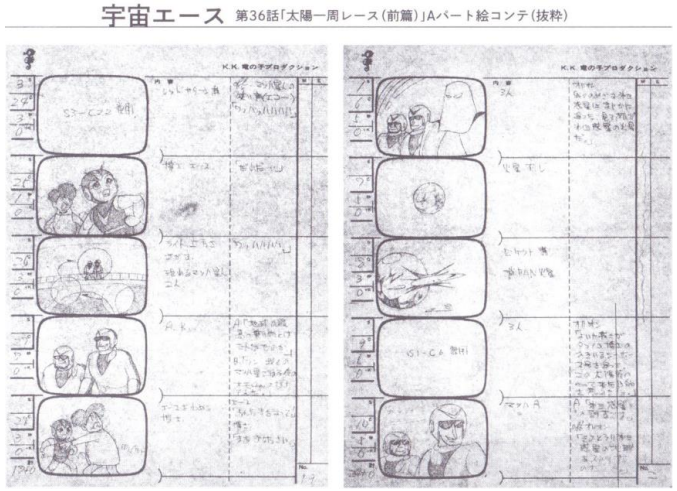


Figure 2.2 A promotional still, c.1933, showing a staged story planning session for *The Grasshopper and the Ants* (1934), featuring Webb Smith seated far left and Walt Disney in the centre. Image provided courtesy of The Walt Disney Company.

?

- The **"story corkboard"** part is completely missing
- Storyboarding process has usually been **handled secretively by a director** and not shared with others until its completion

[Images] Chris Pallant and Steven Price, "Storyboarding: A Critical History," p.50 and p.53 / Seiji Okuda, "Anime no Shigoto wa Omoshiro Sugiru," p.38

Two hypotheses for the feature drop-off: to manage the “continuity”

- The term “E-Conte” comes from “continuity in drawings” and hints a strong influence by **the production process of Japanese live-action films**, such as that of Akira Kurosawa, well-known for drawing storyboards by himself
- “Draft E-Conte could be … revised casually. Although, when it comes close to the completion, … **a revision by other creators would easily break the balance**.”

Yoshiyuki Tomino, “Eizo no Gensoku Kaitei-ban,” p.216

Two hypotheses for the feature drop-off: to catch up with the schedule

- “Astro Boy” is well-known for its labor-saving effort such as the exceptionally limited animation format (**eight frames per second**) and reusing the same character motion with different backgrounds (so-called **bank system**)
- Animated television series resulted in a really packed schedule, and there was no time for discussion between stakeholders

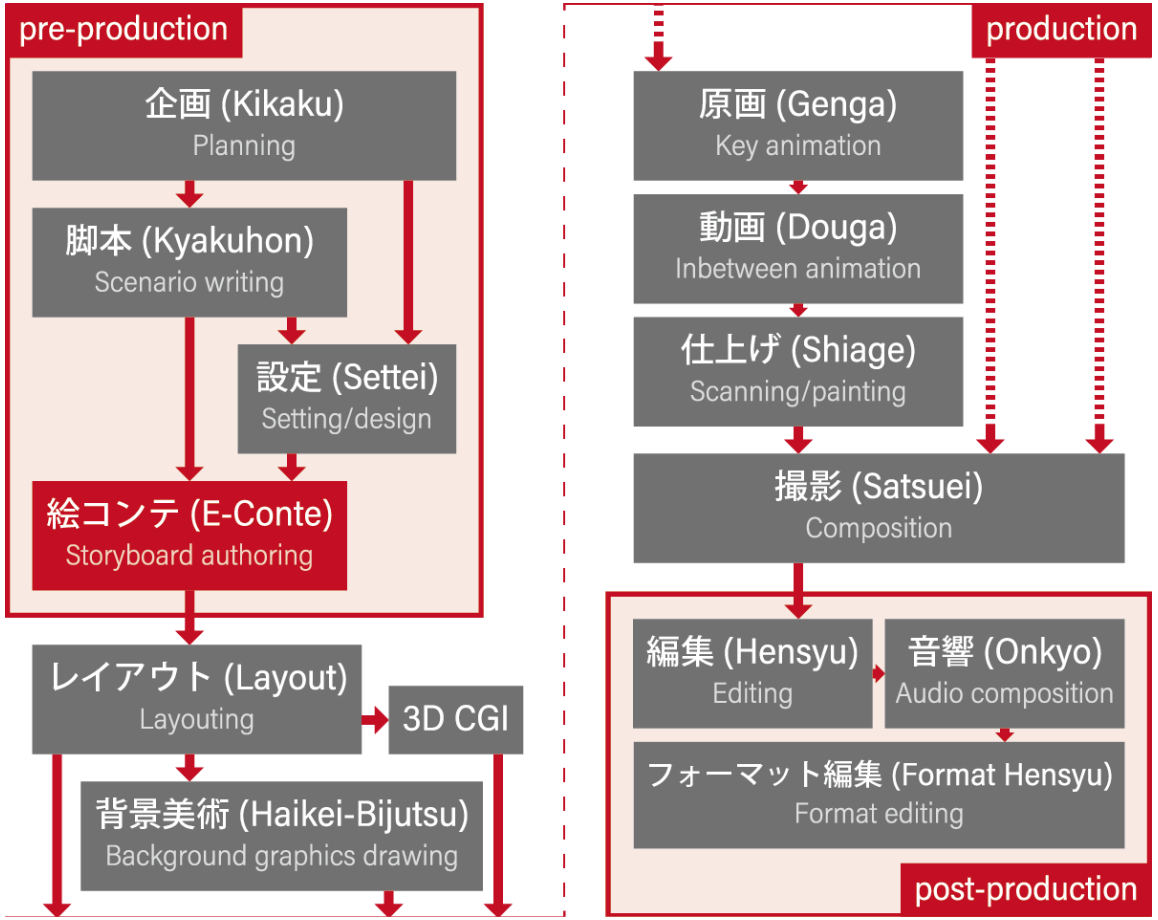
From an interview with Kazuya Murata and the literature, “Anime Taikoku Kenkokuki 1963-1973,” by Yusuke Nakagawa

Q. So, how does storyboarding look like?

E-Conte:
present of anime storyboarding

Past, Present, and Future of Storyboarding in Japanese Animation

Current anime production workflow

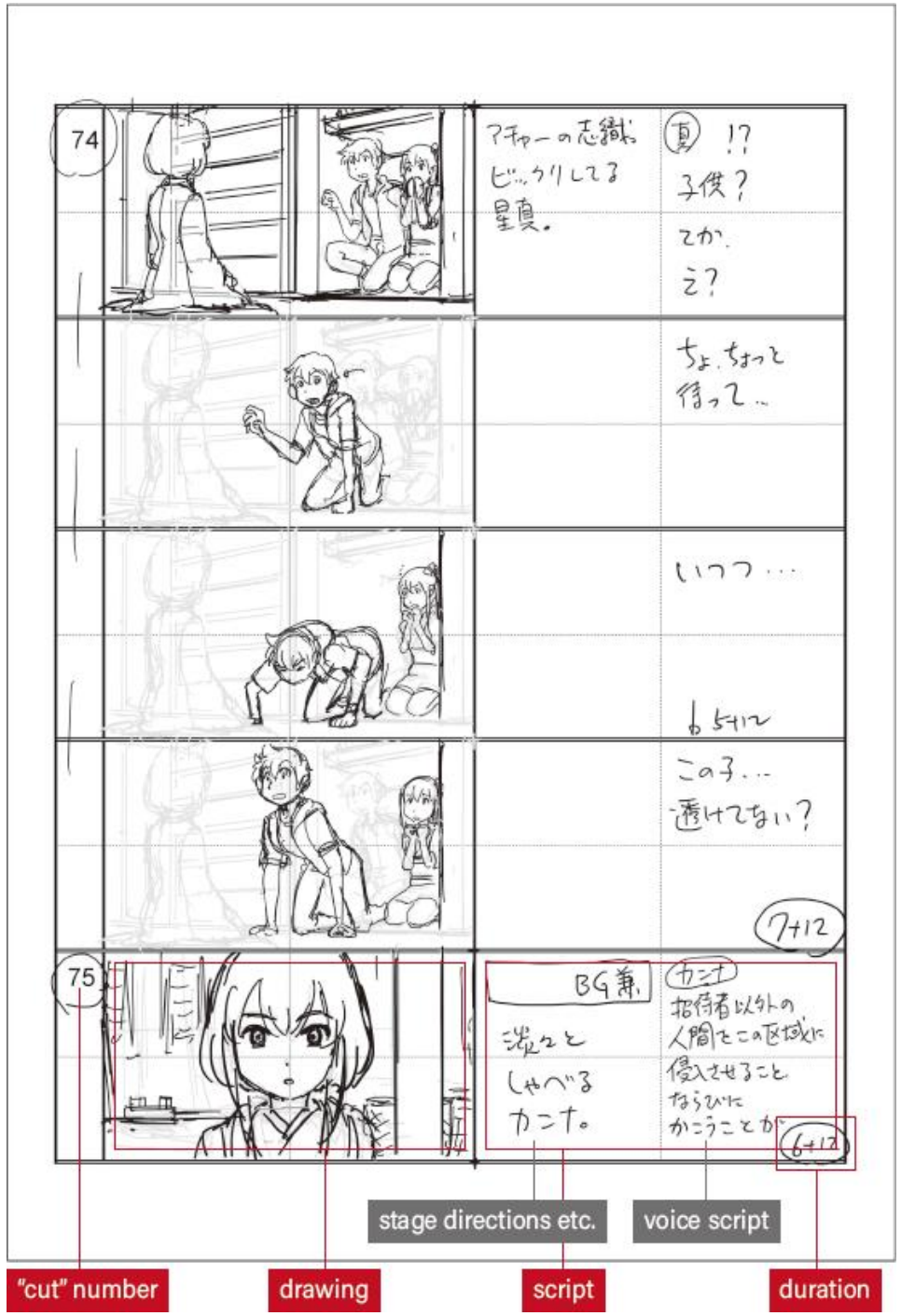


- Roughly divided into pre-production, production, and post-production
- Input to E-Conte includes scenario script, character design, and other settings
- E-Conte serves as the final output of the pre-production step

Current E-Conte format

- An A4 sheet of paper is divided into four to six rows
- Each row is composed of a ”cut” number, a drawing in the cut, script, and duration of the corresponding cut.
- A thirty-minute anime film typically consumes around 100-200 sheets of paper in this format

This storyboard is from “Animation Technology 2019 Spring” p.2, drawn by Kazuya Murata for XFLAGS ANIME “Starlight Promises.”



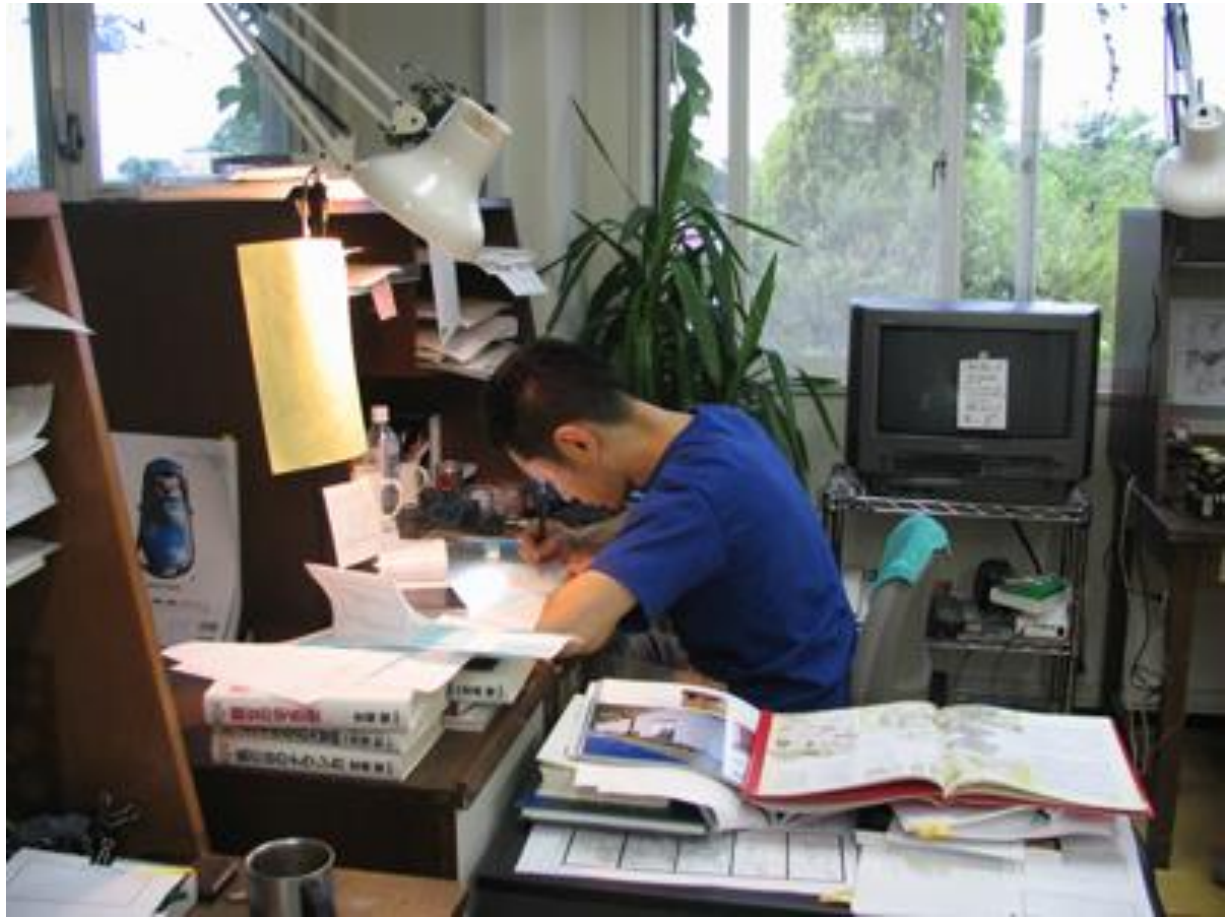
Roles of E-Conte

- **Digest**: understand scenario scripts passed from writers
  - revise and fix who does/speaks what
- **Animate**: turn the scripts into visual cuts
  - surround the characters with the environment
  - make the characters perform actions in specific timings
- **Direct**: pass directions to the production step
  - provide clear instructions to animators, compositors, audio professionals, etc.

From an interview with Kazuya Murata and the literature, “Eizo no Gensoku Kaitei-ban” by Yoshiyuki Tomino

Tools for authoring E-Conte

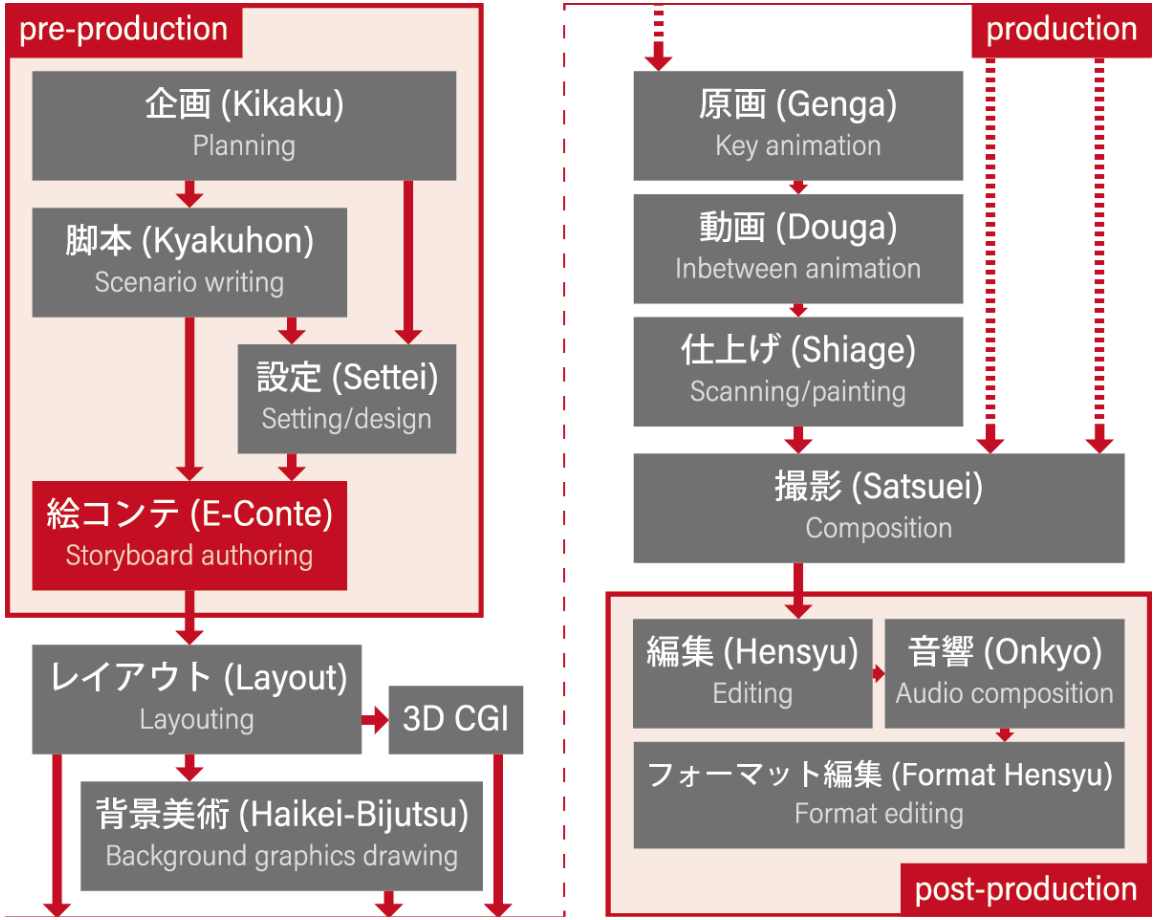
- Sheets of paper
- Pencil
- Stopwatch
- Reference materials



From an interview with Kazuya Murata

[Photo] Studio Ghibli,
https://www.ghibli.jp/ged_01/20making/000508.html

A naïve question: why not digitize?



Most part of the pipeline has already been digitized:

- Word processors (1980s): scenario
- RETAS STUDIO (1990s-2008): scanning, painting, composition
- CLIP STUDIO, Photoshop, Procreate, etc. (2000s-): scanning, painting
- Adobe AfterEffects, etc. (2010s-): composition
- Stylos (RETAS STUDIO), CLIP STUDIO EX, Toon Boom Harmony, TVPaint Animation, OpenToonz, CACANi, etc. (2010s-): key and inbetween animation

Existing effort

- Storyboard Pro
  - specialized for drawing storyboards
- TVPaint Animation
  - originally used for key and inbetween animation
- Both suited for authoring V-Conte (continuity in video)
- Both are made for storyboarding in general, **adapted** for E-Conte, with features like exporting in the E-Conte format
- **Not necessarily the best** for authoring E-Conte

From an interview with Kazuya Murata and YAL Yuma Oue

The difficulties in the current digital tools from the director's perspective

- Software for desktop OS cannot be used **casually** (e.g., let's lie down on a couch and draw storyboards!)
- **Horizontal time axis** causes occlusions by the user's hand and makes it difficult to compare the left and right balance in panels
- **Flexible editing feature for prototyping** is missing (e.g., temporally saving alternative cuts, comparing them, removing, sorting, and re-ordering panels, etc.)

From an interview with Kazuya Murata

The difficulties in the current digital tools from the producer's perspective

- Storyboarding process is solely handled by the director and **completely hidden** from the other pre-production staff
- The resulting E-Conte needs to be **printed and delivered** to hundreds of people in the production step, which would ideally be handled digitally

From an interview with YAL Yuma Oue and Nao Hirasawa

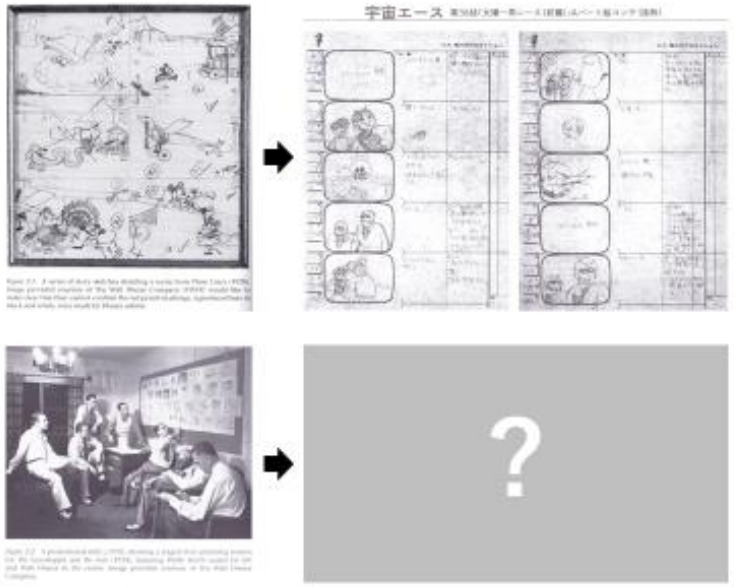
Q. What can we do for the future of storyboarding?

Creativity support for the future of anime storyboarding

Past, Present, and Future of Storyboarding in Japanese Animation

Recap of the “past” section

Missing feature in E-Conte: collaborations

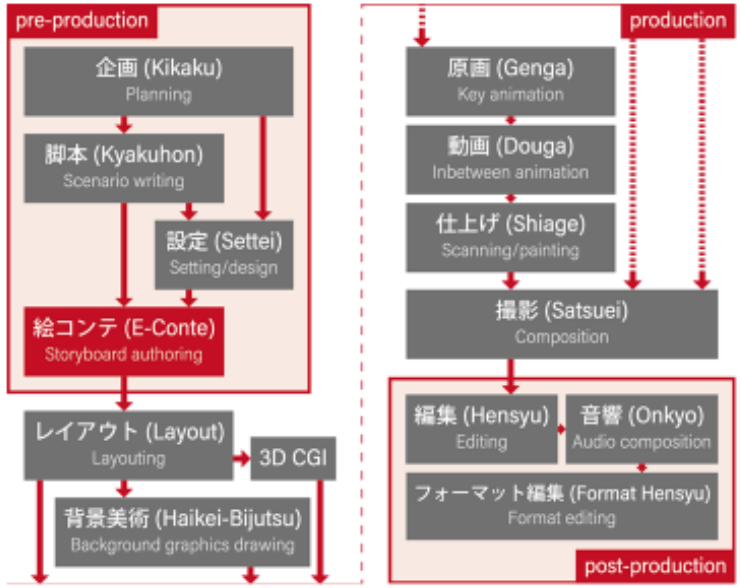


- The **“story corkboard”** part is completely missing
- Storyboarding process has usually been **handled secretively by a director** and not shared with others until its completion

- The benefits of storyboarding for **individual creativity** were properly imported and extended
- Support for **collaborative creativity** was dropped

Recap of the “present” section

A naïve question: why not digitize?



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- The production pipeline is digitized, **except for the storyboarding**
- Creating a digital storyboarding tool for **individual creativity** seems not effective enough

What we learned:

E-Conte is **not only for directors**, **nor for the animators and other people** in the production step.

It is for both.

Multiple perspectives to consider

Roles of E-Conte

- **Digest**: understand scenario scripts passed from writers
  - revise and fix who does/speaks what
- **Animate**: turn the scripts into visual cuts
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From an interview with Kazuya Murata and the literature, “Eizo no Gensoku Kaitei-ban” by Yoshiyuki Tomino

Individual and collaborative creativity support for pre-production step:
practical usability for a director and communication support for people in the pre-production step

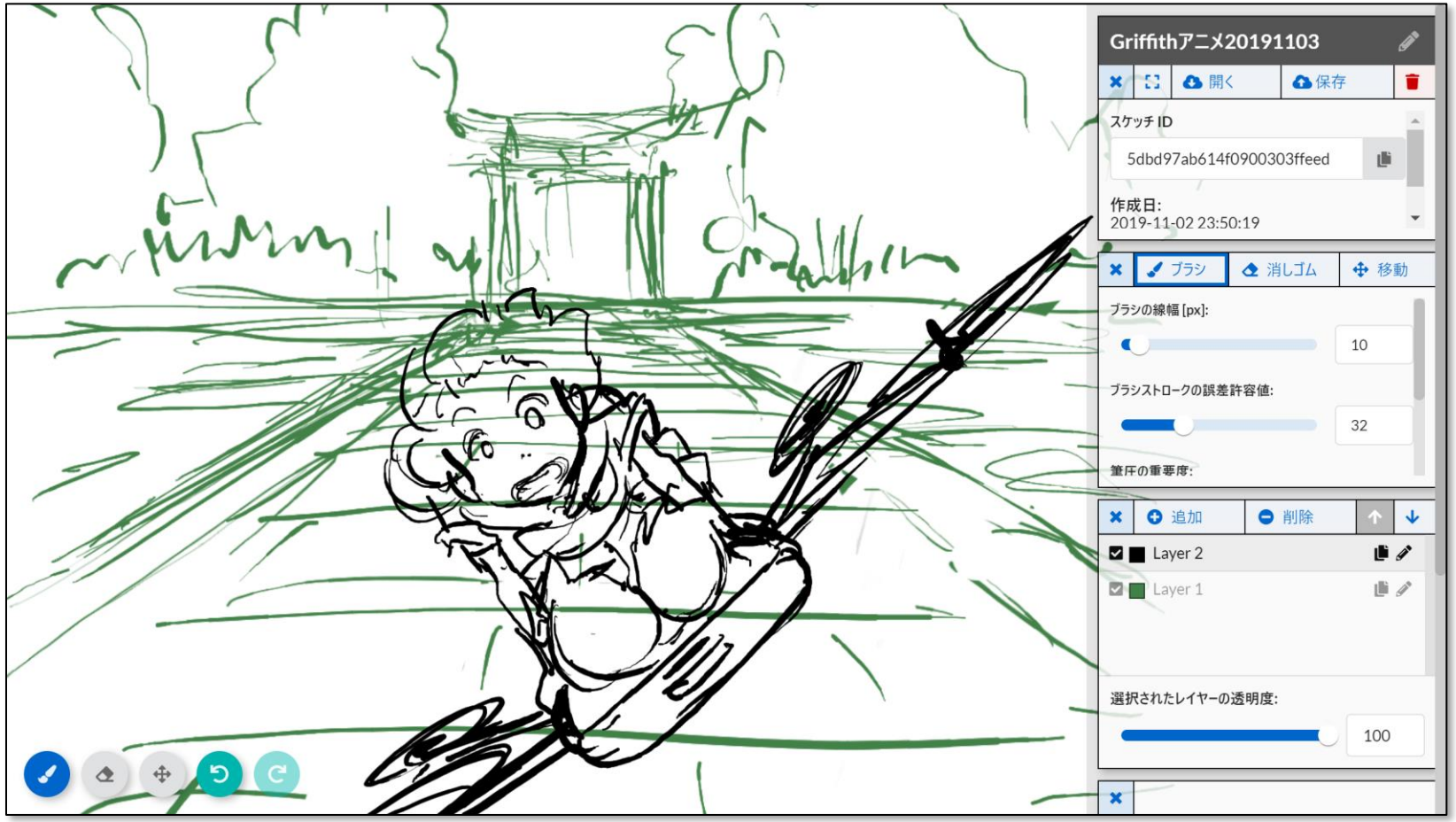
Collaborative creativity support for production step:
direction support for a director, aiding communication between the director and animators and other professionals

Our current goal

Our research began with exploring the design space of building creativity support tools for anime production studios, which can be summarized as: **how to make anime?**

The creativity support tool for storyboarding in Japanese animation should take a form of "**environment design**" than a single tool design, **surrounding the E-Conte content with multiple different user interfaces for a variety of users** including the director, producer, and all the other people involved in the anime production pipeline.

Our ongoing work: Griffith



Based on the lessons learned, we are building web-based idea sketching and storyboarding tools.

We are looking for collaborators – don't hesitate to contact us!

Jun Kato <jun@archinc.jp>

ARCH | Research

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