Past, Present, and Future of Storyboarding in Japanese Animation

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

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

An example of successful tech transfer:

**TicTacToon ➡ Toon Boom Technologies**


![Diagram of the TicTacToon process](image1.png)

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

![Diagram of the Layout module](image2.png)

*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

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

Storyboarding at Disney in late 1920s and 1930s

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.

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”
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


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


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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?

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.

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

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-Conête includes scenario script, character design, and other settings
- E-Conête 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

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

Missing feature in E-Con: 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.
Recap of the “present” section

A naïve question: why not digitize?

<table>
<thead>
<tr>
<th>Pre-production</th>
<th>Production</th>
<th>Post-production</th>
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</thead>
<tbody>
<tr>
<td>全面 (Kihaku)</td>
<td>原案 (Genga)</td>
<td>環境 (Hensyu)</td>
</tr>
<tr>
<td>Painting</td>
<td>Key animation</td>
<td>Editing</td>
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<tr>
<td>動画 (Couga)</td>
<td>動画 (Couga)</td>
<td>音響 (Onkyo)</td>
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<tr>
<td>Scenario writing</td>
<td>Inbetween animation</td>
<td>Audio composition</td>
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<tr>
<td>設定 (Settie)</td>
<td>仕上げ (Shiage)</td>
<td>フォーマット編集 (Format Hensyu)</td>
</tr>
<tr>
<td>Storyboarding design</td>
<td>Scanning, painting</td>
<td>Format editing</td>
</tr>
<tr>
<td>絵コンテ (E-Conte)</td>
<td>撮影 (Satsuei)</td>
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<td>Storyboard authoring</td>
<td>Composition</td>
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<td>レイアウト (Layout)</td>
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<tr>
<td>Layouting</td>
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<td>背景美術 (Haisoku-Bijutsu)</td>
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<td>Background graphics drawing</td>
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<td>3D CSG</td>
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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-Conète

- **Digest**: understand scenario scripts passed from writers
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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!

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