Future Art Ecosystems (FAE): Strategies for an Art-Industrial Revolution

Serpentine R&D Platform & Rival Strategy

Future Art Ecosystems (FAE) develops strategic insights for practitioners and organisations across art, science, technology and policy. FAE is a joint effort of Serpentine Galleries' R&D Platform and Rival Strategy. Taking form of annual policy documents, each issue responds to an emerging ecosystem situated between "culture" and science, technology, and commercial industry. FAE conceptualises infrastructural shifts, and details practical options and emerging strategies for relevant actors in the field. The first volume, on art x advanced technologies, was released in mid-2020. Included in *Stages* is Chapter 3: **'Strategies for an Art-Industrial Revolution'.**

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The *infrastructural plays* detailed in the previous chapter tend to be undertaken in relatively local and ad hoc ways. A museum may buy equipment to host an AI project, a tech company may put out an open call for artistic collaborations or an artists' studio may launch a digital product.

This chapter outlines strategies that more overtly draw together multiple infrastructural plays into broader configurations. They involve building substantial ecosystems that support AxAT projects more broadly, providing integrated ways to fund, produce and distribute them. As such, they have both the intention and the potential to create revolutionary shifts, generating new eco- systems of activity that only partially intersect with the current landscape of
the art industry.

The strategies outlined here offer frameworks for articulation and cooperation between art, artists and advanced technologies. Each also implies a certain conception of the place and function of art, with implications for how artists access technology, the spaces in which they present their work, the financial models available to them and the risks involved for those participating in them. The general description of each strategy is followed by a summary of its strategic significance for the various actors involved.

The Tech Industry as Art Patron

Art as a source of opportunities for the technology sector

This strategy builds on a substantial history of large corporations working with artists, especially in the US, and notably centred on the electronics industry and its transformation into the Silicon Valley model.[64] Famous historical examples extend from Bell Labs to Xerox PARC, and have frequently taken the form of programmes that give artists on-site access to technological equipment, technical support and expertise.

Under the terms of this strategy, there is an exchange primarily between the artist and a team working under the auspices of a corporation, typically through *tech residencies* and *tech provision*. Other actors from the existing art industry ecosystem may also be involved, for example museums or galleries.

> **It's important [with these engagements] that it's not just presenting the approachable, acceptable face of a new technology, where there's no criticality towards [the technology], it's just kind of like a demo. It's like demo art of someone else's tech. Holly Herndon [65]**

A common argument from cultural institutions for brokering these relationships is that artists are working 'upstream' of developments in consumer technologies, with the implication that their work explores opportunities for the application of these technologies.[66] There is a strong historical tradition of tech companies engaging with artists in this way.[67] However, there is no necessary linear relation between these experiments and later product development, and the *tech industry as art patron* strategy boasts a more sophisticated conception of the role of art in relation to industrial concerns. Indeed, it is relatively common knowledge in the tech business that there is no solid relationship between providing spaces for the free exploration of new technology and product development—even when these spaces come in the form of internal 'innovation labs' that do not involve artists whose values may clash with those of the business.[68]

More complex motivations for tech companies to engage with artists can be understood as a portfolio of potential advantages:

1. Organisational learning, from the level of individual employees and teams working with artists, to divisions and global governance. This is effectively the 'product innovation' model, but without a linear conception of product development—rather, it places a general value on exposing organisational culture to alternative perspectives on technology and its application, thus challenging assumptions rather than straightforwardly providing 'solutions'.

2. Domain-specific knowledge and expertise benefiting the usability of emerging technologies. As one example, spatial technologies expanding into areas that have historically been the domain of fields such as architecture or theatre —there are specific techniques, processes and insights that can be translated to advance the usability of new technologies such as VR, AR and AR cloud.

3. Providing public-facing PR and CSR opportunities, through the exhibiting of specific groundbreaking projects and general 'support of the arts'.[69]

4. Signalling a commitment to innovation to external investors and internal stakeholders.

5. Signalling a commitment to creativity and innovation to prospective (younger) employees in talent pools where hiring is increasingly competitive and for whom workplace values/culture plays an important role in attracting such talent.

6. Providing space for employees to engage in temporary (i.e. full-time but not permanent) or part-time pursuit of their own projects in collaboration with artists, for the purposes of professional development and staff retention.

7. Leveraging the art world, broadly understood as an epicentre of creativity with deep cultural import, as a place to secure a boost for organisational reputations as actors of fundamental importance in contemporary society for a public audience.[70]

Given the diversity of these potential benefits, the *tech industry as art patron* strategy may be seen more as an 'experiment' for the tech company than as a bid for the pursuit of any specific, stated, long-term objectives. Hence, some companies that adopt this strategy do so in the form of an open platform.[71]

It is conceivable that this strategy could extend into creating new venues for commissioned work.[72] However, it also aligns with a policy of drawing on the expertise, reputation and audience of established cultural institutions (an inversion of the 'success in adjacent fields' principle that is one aspect of the *common features of emerging practices* described in Chapter 1). This suggests a deepened relationship between existing art industry actors and tech companies. However, this strategy also introduces a swathe of new tensions in the interactions between art and tech cultures.

In the first case, it may be that given the fringe relationship of art to its core mission, a tech company may only provide ongoing support to a small number of arts institutions within the same region. Secondly, this support is not necessarily long-term, being subject to shifts in corporate governance and changes in overall company strategy.[73] These factors introduce a degree of turbulence into the art industry, as large-scale economic actors from elsewhere move in and out of the field.

Lastly, this strategy creates complexity in the ambitions and objectives native to the art world and those of corporate policy. The wider actions of large commercial companies may adversely interact with the arts ventures they support on many levels, providing new twists on the ongoing scandals around corporate sponsorship of artistic programmes.[74] The contradiction between economies of scarcity and the value placed on large-scale operations in industry also creates structural problems, and indeed there are discrepancies at the general level between the cultures of tech and art.[75] [76] It may also be that the low-level operations of these collaborations foster uncomfortable conditions for some artists.[77]

Strategic Significance

For AxAT artists:

access to skills, equipment, and expertise; potential ethical and political risks.

For the tech industry:

exposure to alternative ways of thinking about their technological development pathway, deep

historical knowledge and domain expertise in areas that are undergoing technological change— implying a range of associated benefits and risks.

For cultural institutions:

technically sophisticated work to present to the public; a potential collaborator or competitor; potential ethical and political risks.

For private sector investment:

tech industry itself displaces some channels of private sector investment (e.g. collectors), and lowers market circulation; potential investment in spin-offs from larger companies; real estate development and public-private partnership access points for urban regeneration projects through supporting tech sector/cultural sector interactions.

For public sector investment:

city- or national-level branding/soft power; state role supporting early stage innovation; ability to cross-over tech innovation and cultural sector funding.

Open questions

- What would a museum fully owned and operated by a technology company look like and who would be its audience?
- How far can AxAT projects ultimately impact the development pathway of products, services and platforms within a tech corporation?
- How can much smaller tech organisations be involved?
- What role do governmental or academic science and engineering programmes have to play in the configuration, regulation and nurturing of these new relationships?

The Art Stack

Art as the driver of ambitious large-scale projects provided directly to the paying public.

I think artists in general are actually quite bad at imagining how to make their dreams come true at a bigger scale. Bigger not necessarily in terms of grandness, but more complexity.Ian Cheng

A second strategy is based on the consolidation of both AxAT infrastructural plays and existing aspects of the art ecosystem into a new format: the *art stack*.

Art stacks are artist-led organisations that progressively bring together in-house functions currently distributed between artists, curators, galleries, museums, tech companies and others involved in AxAT projects. The seed of the art stack strategy lies in the need for AxAT artist studios to develop *integrated studios* around *DIY approaches to tech*. The art stack builds on this position by locating a revenue stream —one that gives it autonomy from common funding sources in the art industry (e.g. sales to collectors, or project-specific funding from a company or governmental body). In turn, this creates opportunities for the art stack to invest in itself, and to build and control its own versions of other features currently provided by the art industry, such as places to show work.[78]

Artist-led companies such as teamLab present one vision of the art stack strategy, combining *integrated studios*,*DIY approaches* and well-equipped *collective spaces* with *dedicated display spaces* and funding through *ticketed experiences*.79 At the time of writing, teamLab has over 650 personnel ranging across art, architecture, animation, coding, marketing, robotics and other disciplines. It has also built its own site in Tokyo—teamLab Borderless, operated in collaboration with the Mori Building—to host its large-scale immersive digital works. Borderless opened in 2018 and attracted 2.3 million visitors in its first year, making it the most popular single-artist museum in the world as measured by footfall.[80]

This demonstrates the potential of art stacks to expand to a larger scale than many well- known current museums—an observation that has precedent in the power-law distributions that have emerged in

other media across the cultural sector, accompanying a shift from a craft-based model to an industrialised one: Hollywood movie studios, major record labels, the Italian development of the fashion house system, videogames and social media.

Where reliant on *ticketed experiences*, the art stack operates in proximity to the financial models of circuses and theme parks: mass-market models organised around ticketed access. For some actors in the art world, this may raise the question of whether they are indeed 'art spaces' or just a variation on existing entertainment typologies. More generally, a direct-to-consumer, mass-market model organised around ticketed events (or in future, perhaps product design, digital services, etc.) may raise the question of *minimal viable art* for those who remain attached to older models of the cultural institution and art industry more generally —i.e. What is required for these initiatives to be understood as 'art' at all?[81]

Seen from a different point of view, 'minimum viable art' challenges preconceptions around the anticipated scale (of team-size, turnover, physical dimensions, etc.) of existing art practices; and it may be that it invites connection to quite other art histories which are not always obvious to the current generation of Western critics (or other audiences).[82] This demonstrates the possibility of a successful art-industrial phenomenon that publicises an alternative conceptual engagement with what art is and could be—one that diversifies away from the existing narratives of the mainstream contemporary art world.

The art stack holds the promise of a much richer engagement between artists and technology, within dedicated environments (physical, technical, presentational and commercial). Art stacks may be modelled around quite a different financial core, such as *building tools* or selling *art products*, and may explore other routes to the public, such as deep use of online spaces.[83] But they also offer a model of artistic practice that is substantially different from what is widely valorised in the art world at present.

'Minimum viable art' aside, two factors in particular stand out. The first is that the operational model of 'the artist' becomes something almost entirely team-based. This diverges from the 'individual artist' model preferred by the existing art world (and often presumed by the art industry), to a much greater extent than 'a collective' or the kinds of approaches favoured by *integrated studios*. Although it is possible that a relatively flat hierarchy might be adopted inside some art stacks, the contrast in expectations from current art training and professional life are nonetheless very substantial, placing an emphasis on skills for negotiating complex, ongoing work relationships within common projects where personal or small-group authorship is diminished.

The second factor is the uneasy relationship between many extant artistic practices, including those involving advanced technologies, and the kinds of commercialisation necessary to fund an art stack. The possibility of generating art stacks has been refused many times in the past, including by pioneering AxAT artists.[84] Art stacks require a very particular negotiation of the relationship between commerce and art, and this may filter both the practitioners and the practices that are able and willing to generate them.

Strategic Significance

For AxAT artists:

a new, art-led structure for those whose work fits with it, capable of operating at a new level of artistic ambition; lowered reliance on contemporary models of artistic funding (i.e. existing channels of private and public investment).

For the tech industry:

potentially new high-level collaborative or competitive relationships; a sophisticated content pool that can be ported to emerging platforms.

For cultural institutions:

source of technically sophisticated work; a potential collaborator but also competitor.

For private sector investment:

lower influence of collectors and auctions; potentially profitable early-stage investment, art stack IPOs; potential real estate development and public-private partnership access points for urban

regeneration projects through supporting tech sector/cultural sector interactions.

For public sector investment:

city- or nation-level branding/soft power; potential for standout tourist destinations, state role supporting early stage innovation.

Open questions

- Over the mid-term, how far will art stacks be distinguishable from organisations in entertainment or product design?
- Over the long-term, to what extent can the art stack model be expected to disrupt and undermine traditional models of singular authorship, both from a symbolic perspective and the operational reality of offering a more attractive context for specialists to contribute their skills?
- What would an art stack for services look like?
- What will be the impact of the art stack model on arts education?

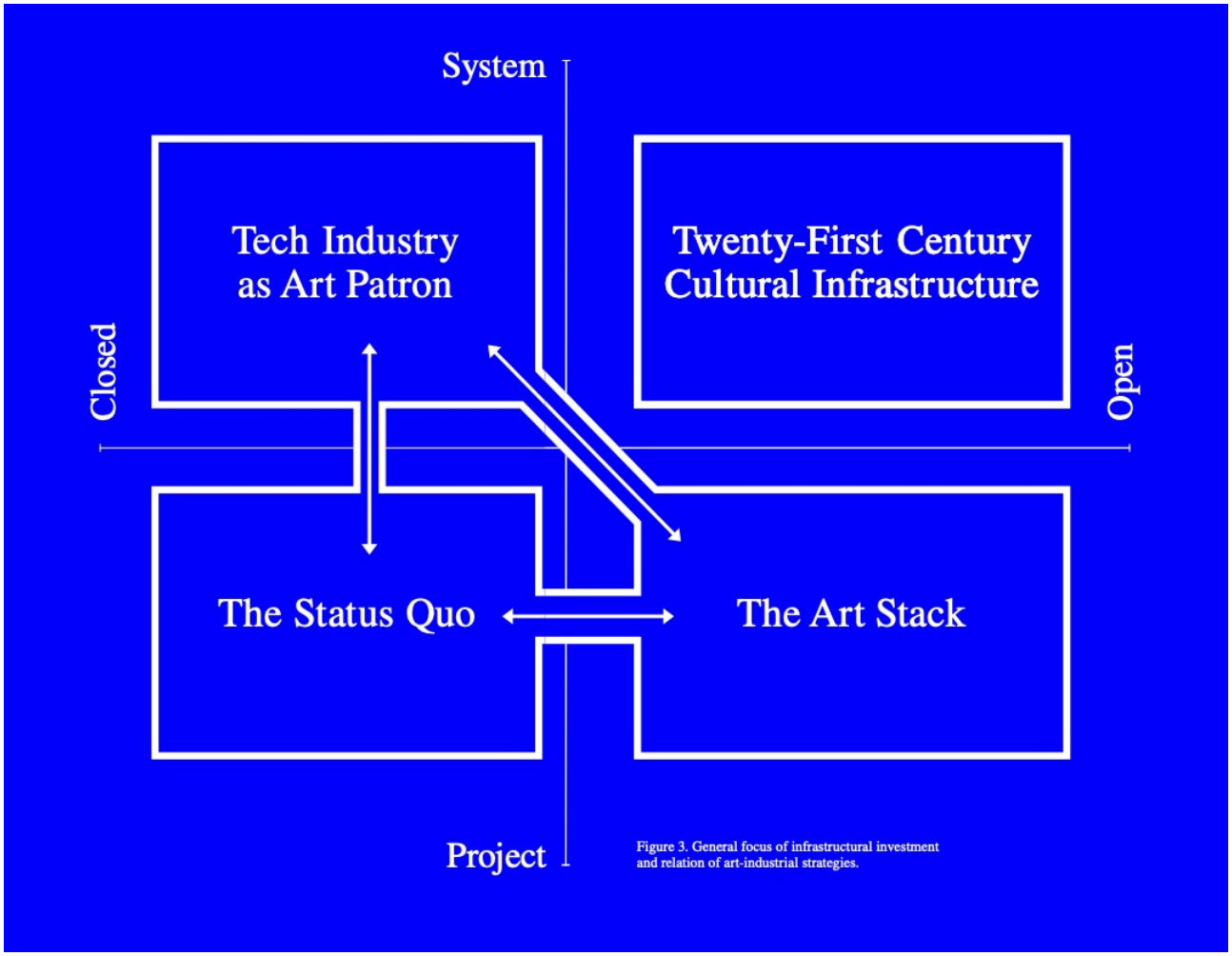


Figure 3. General focus of infrastructural investment and relation of art-industrial strategies

Twenty-First Century Cultural Infrastructure

Art as a strategic societal asset

We need new institutions to deal with the new problems that are emerging. **Holly Herndon**

The strategies of the *tech industry as art patron* and the *art stack* represent major disruptive vectors in the existing art industry. They represent new movements poised to redistribute the balance of power in

the contemporary art world landscape.

They clearly demonstrate the potential for certain strands of AxAT to scale up their operations substantially. But the particular modes of scaling they offer are ultimately constrained by the financial, operational and strategic demands of very particular kinds of large-scale private-sector organisations, be they tech firms operating as patrons or sponsors, or *art stacks* themselves.

In contrast, the third strategy described here involves the conscious development of a *twenty-first century cultural infra- structure*.This strategy entails the construction of systems designed to support the AxAT ecosystem as a whole, and which are aligned with and responsive to a broad societal agenda.

> **A lot of questions that aren't being asked by artificial intelligence scientists and investors are being asked, and have been asked for quite a long time, by some kinds of artist... In a very hard, pragmatic way, this art is becoming relevant to the moment we are about to live through. Jonathan Ledgard [85]**

As described in the introduction to this document, AxAT can be understood as a form of technological innovation that is conditioned by a very different approach to technology —how it is developed, deployed, used and valued. AxAT practitioners frequently work with technologies that may have major societal benefits, but as yet do not synchronise well with existing funding regimes.

- Working with very early stage technologies with no clear pathway to immediate application, or those that have potential for application but do not readily fit with either consumer-focused retail or existing major infrastructural plans, and therefore are yet to find a pathway out of the laboratory.[86], [87]
- Operating to actively critique existing means of technological development, e.g. artist Trevor Paglen and AI engineer Kate Crawford's ImageNet Roulette, which identified racist patterns in the AI encoding of the ImageNet public image database, leading to the withdrawal of over 600,000 images.[88]
- Using technology to provide alternative approaches to non-technological domains, extending AxAT's principle of *success in adjacent fields* into a tangible, quantifiable impact on systems of collective decision-making such as government and law. An example is Forensic Architecture's *Grenfell Tower Fire* project, which draws data from smartphone footage taken by members of the public of the devastating fire at the London apartment block in 2017, in order to reconstruct the order of events—an operation that enters into the legally charged context of determining accountability for the disaster.[89]

The twenty-first century cultural infrastructure strategy is responsive to the value provided by such projects, while acknowledging that their widespread development requires an approach not easily reconciled with the strategies detailed previously. The *art industry* capabilities necessary to effect this strategy vary widely, and it is unlikely that a single actor at less than national government scale could adopt them all. This strategy is therefore best represented through a federation of efforts to bring infrastructural plays into alignment, at different levels and scales.[90] The central components of the strategy include:

Alternative routes to access tech.

The development of systems that lower the barrier to access of advanced technology, in ways less dependent on patronage or the ongoing negotiation of sponsorship, and enabling a maximally diverse set of practitioners and perspectives to engage with technologies at all stages of development. These can be envisioned as third-party systems that enable AxAT practitioners working in specific subfields (e.g. VR, synthetic biology) to develop and display work in environments, such as existing galleries or museums, that cannot on their own contribute sufficient capital investment to develop in-house skills, equipment and capabilities to host this work.[91]

Legal arrangements.

Building on the tradition of experiments with artist's contracts, the development of new ways to

enable engagement between partners on AxAT projects.[92] On one level, this means finding alternatives to the common three-month residency arrangement which are better suited to the cost, time frame and collective nature of serious AxAT projects. On another, it means broaching imminent legal questions spurred by AxAT technologies themselves, such as the legally complex debate about whether the person who provides data used to train a machine learning system has a claim to its products.[93] Additionally, existing means of representation for artists, an essential art-industrial function of galleries, may be inadequate to the demands of AxAT practice, and may both require and reward serious innovation.[94]

Learning and insight.

The generation of new knowledge by AxAT practices is an asset in its own right, and not purely in terms of intellectual property. A logical development of AxAT skill-sharing (a semi-official feature of *multidisciplinary courses* and *collective spaces*) is the development of new kinds of venues in which to share what has been learned.[95] This also extends to the strategic deployment of AxAT practices as sources of collective insight into unfolding conditions, and accordingly suggests a place for government departments, legal bodies and other 'non-technological' agencies in the commissioning and development of such work.[96]

Distribution systems.

Current experiments from within AxAT such as *building tools*, *art products and byproducts as assets* have, to date, largely conformed to models widely adopted within the tech industry—for example, retail of designed products to individual consumers, or seeking venture capital investment. On the other hand, while there has been innovation around *designing purchase mechanisms*, they have not (or not yet) achieved widespread adoption.[97]

While not per se exclusive of input from either the *tech industry as art patron* or *art stacks*, this strategic approach is more closely aligned with the mission of cultural institutions and the various bodies that support them (such as foundations, funding councils and government departments). It represents an extension of these bodies' mission to maximise the audience of cultural projects on the grounds of their significance to broader society—albeit also constituting a series of breaks with how this role tends to be understood at present.

> **Cultural institutions should play a role in helping point public attention to the things that we should be paying attention to. And those are usually things which are not in the top headlines, which are not beholden to the advertising industry and not necessarily responding to political talking points. They should play a beacon or spotlight role. Noah Raford [98]**

The most obvious infrastructural plays available to existing cultural institutions such as museums and galleries are those that enable them to retrofit AxAT into current systems. For example, a new or existing museum might build *dedicated display spaces* to host AxAT work. This is a major capital investment, with particular risks.[99] But while valuable in its own right, this only treats one aspect of the AxAT ecosystem, and deeper shifts in operations would be necessary to engage fully in the project of building twenty-first century cultural infrastructure. Likewise, this strategy would be expected to align with national- or international-level governmental policies around the support of both the arts and innovation, but bring them together in historically new ways.[100]

Strategic Significance

For AxAT artists:

greater autonomy with respect to tech industry; lower barriers to access to advanced technologies; other ways to scale impact of projects, outside of traditional art, tech or entertainment industry channels.

For the tech industry:

opportunities for small-scale and/or emerging-technology developers.

For cultural institutions:

a pathway to alternative operational models.

For private sector investment:

opportunities to be involved in emerging technologies not married to conventional startup pathways.

For public sector investment:

production of insight and intellectual property as strategic assets at societal level; alternative system to develop genuinely innovative ideas.

Open questions

- What would a major public art institution look like without physical exhibition or performance spaces?
- What type of metrics would be needed to evaluate the impact of work that exists within art and also outside art?
- How can cultural institutions support the development of technologies that do not satisfy the contemporary funding conditions of the tech industry?
- How can AxAT be a part of national or international industrial strategy, and what would be the impact of this on the cultural sector?
- At what point does this strategy constitute the incorporation of an 'alternative tech industry'?
- Is it possible that such a large-scale initiative could separate from the art world as currently understood and becomes autonomous, with its own funding mechanisms, institutions and discourse—a hard fork in the art world?

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[64] There are historical examples of artists placing themselves in social and commercial partnerships, for example John Latham's *Artist Placement Group*. Link: bit.ly/2Tfu6mh

[65] Holly Herndon is a Berlin-based American composer, known for sophisticated integration of digital systems and especially artificial intelligence with the human voice and live performers.

[66] Paris Innovation Review argues that placing artists within cutting-edge research programmes helps with *decompartmentalisation*, helping researchers to innovate and learn from other fields. Link: bit.ly/2NiTBzt

[67] Natalie Jeremi jenko's *Live Wire* installation, designed at Xerox PARC, is an early example of physical interfaces to networks being deployed as a *ubiquitous computing* experiment. Link: bit.ly/2FH0oyU

[68] Simone Bhan Ahuja recently argued in *Harvard Business Review* that 90% of innovation labs fail because placing research in a *laboratory setting* isolates it from meaningfully engaging with the goals of organisation. Link: bit.ly/2FDbIBv

That said, the approach has produced some significant successes over the years, most famously at Xerox PARC. Link: bit.ly/30aBWPA

[69] Corporations frequently engage with the arts as part of their corporate social responsibility work, i.e., business commitments to reinvest a fraction of profits into projects of social benefit.

[70] The prevailing art world discourse may position art as critically reflective on the broader culture; but it may be this asserted criticality itself that makes art an attractive vehicle to corporations keen to present themselves as culturally sophisticated. Link: bit.ly/2TiRgs3

[71] Primer is an arts platform based in the headquarters of Danish biotech company Aquaporin, which describes itself as being *'intended as a platform for production, development and support for artists and the field of art in general, exploring its introduction into new spaces and professions.'* Link: bit.ly/2RcpGdi

[72] Apple have recently launched several augmented reality programmes, developed with artists and educators in collaboration with the New Museum. These include in-store events under the rubric of Apple AR[t] Labs and related AR[t] Walks through public urban spaces. Link: apple.co/2tU1nJ3

[73] A userful warning about the limited attention span of corporations investing in art programmes is the closure of the Interactive Design Institute Ivrea in 2005, after only four years of operation. Link: bit.ly/30cBVur

[74] As a thought experiment, it is entirely possible given the possibility of nation-state and supra-national legal moves against social media networks (e.g. anti- monopoly legislation, media regulation)—plus scandals such as Cambridge Analytica's involvement with Facebook—that the support of artists by such companies could trigger a backlash and become branded as *'trustwashing'*.

[75] As Mike Pepi summarises '*Christie's thrives on scarcity. Google does not.'* Link: bit.ly/2TeR8d7

[76] For example, see Lucy Sollitt's 2019 report for Creative United on The Future of the Art Market, which highlights some of the urgent challenges faced across the arts in adapting to new forms of techno-economic infrastructure. Link: bit.ly/3b5QPXw

Note further that, while hard data is difficult to acquire, there are many accounts of tech industry figures being favourably disposed toward art and artists but being extremely skeptical of the art industry's systems of valuation. Link: bloom.bg/2yyK9DZ

[77] *'If you were working with a developer and coming up with idiosyncratic approaches towards a specific machine learning architecture, then another artist comes into that residency and the developer takes some of those ideas and applies that to the next person—that's something that can be really problematic in an arts context. Likewise, if you have the same developers working with a large pool of artists and you have one specific approach towards technology that is then funnelled into different practices rather than having dramatically different approaches'.* Holly Herndon

[78] It should be noted that large-scale studios are not themselves unheard of in the history of art. For example, Rubens was famous for his huge workshop filled with students and apprentices, whilst at one point Damien Hirst employed 250 people, worked with high budgets and opened a museum. Such ventures, however, typically have been lacking some of the features of AxAT practice itemised in Chapter 1, and represent a continuation of conventional art industry models under new ownership, as it were, rather than a break with the status quo as indicated by the kinds of infrastructural plays documented in Chapter 2. Link: bit.ly/2FFDM1J

[79] teamLab run their own 10,000-square-metre digital art museum in Tokyo. Link: bit.ly/37PI6HE

[80] Tickets to teamLab's *Borderless*cost approximately $30 in 2018, when they attracted 2.3 million visitors.

[81] An alternative conceptualisation might be that art stacks exceed *maximum viable art*, given that they operate beyond the financial and organisational models that have predominated in the art world to date.

[82] teamLab locate reference points for its expansive immersive environments in premodern Japanese art, specifically what it calls *ultrasubjective space*, which offers an alternative conception of the optical relation of viewer to artwork, based in premodern Japanese pictorial traditions rather than Western linear perspective. The viewer imagines themselves as a component of a depicted scene, rather than observing it from the periphery. Link: bit.ly/2Tqedd9

[83] As in the case of pop artist KAWS, the output of whose work spans limited edition vinyl toys available to the mass market, large-scale sculptures positioned within the contemporary art milieu, and collaborations with fashion brands such as Supreme and Nike.

[84] Pioneering biotech artist Oron Catts worked with early stage tissue culture technologies. Despite the evident art stack potential—via an art product or building tools modelling his early work developing *victimless meat*and *victimless leather*—Catts sees the commercial development of these ideas as symptoms of consumerism and antithetical to the deeper concerns of his practice. Link: bit.ly/37Y7eMg

[85] Jonathan Ledgard collaborates with artists on technology and nature, is a novelist, expert on AI and robots particularly in Africa, foreign and war correspondent for The Economist.

[86] Protocells are an example of an early-stage technology with no clear pathway to immediate application.

Link: bit.ly/2slv05W

[87] Neighbourhood-level electricity generation is an example of a potentially significant technology that does not readily fit with either consumer focused retail, nor existing major infrastructural plans.

[88] Trevor Paglen and Kate Crawford:

'We created ImageNet Roulette as a provocation: it acts as a window into some of the racist, misogynist, cruel and simply absurd categorisations embedded within ImageNet. It lets the training 'speak for itself', and in doing so highlights why classifying people in this way is unscientific at best, and deeply harmful at worst.' Link: bit.ly/37V4Fuu

[89] At the time of writing, Forensic Architecture are crowdsourcing video footage of the Grenfell Tower fire in order to projection map an accurate 3D video of how the fire progressed through the building. Link: bit.ly/2taLhL9

[90] *Federation* is used here to mean something similar to *interdependence*, as advocated by Holly Herndon and Mat Dryhurst as a principle for an alternative to the *independent music scene*, focused on complex ecosystems of new organisations and financial models, and evolving relationships to audiences and tools. Link: bit.ly/2t8Nqak

[91] One mechanism for opening up routes of access to technology would be the provision of platforms to enable consortia to be built around AxAT-related capital investment from cultural institutions, much as is the case on major academic science and engineering projects like CERN.

[92] W.A.G.E. is an activist organisation working to establish sustainable economic relationships between artists and the institutions that control the art world. Link: bit.ly/2RbUMSB

[93] Property rights over personal data has evolved into a heated debate, and the knock-on debate over who owns the intellectual property of technologies created from that data is likely to become even more contentious as those products become more valuable. Link: bit.ly/2FDhEFb

[94] One could make a comparison to the growth of *label services* in the music industry. Traditional record labels provide artists with a portfolio of services (management of publishing rights, making arrangements with stream services, pressing records, tour organisation) in return for a contract that is usually exclusive and long-term. Label services disaggregate these functions into individual services that artists can opt into and out of, as and when needed. Link: bit.ly/2tTN3AE

[95] As part of a recent retrospective at London's Institute for Contemporary Art, Forensic Architecture ran a series of skill-sharing short courses in forensic architecture, offering the public training in techniques they had developed. Link: bit.ly/30h6Oya

[96] Relatively small-scale initiatives like the UK government's Policy Lab currently take a version of this approach, although largely without engagement of the kinds of technology with which AxAT practitioners are working. Link: bit.ly/2TfWfKg
The most serious investment in this strategy to date is arguably the Dubai Future Foundation and the related Museum of the Future. Link: bit.ly/2NjSAXM

[97] Attempts at building AxAT distribution systems have tended toward a degree of conformity with legacy art industry practices, such as aligning with a model of value as being produced by scarcity.

[98] Noah Raford is Futurist in Chief and Chief of Global Affairs at the Dubai Future Foundation.

[99] The high cost of systems needed to display AxAT works, which include both technology and the expertise to deploy and maintain it, is itself prohibitive, and represents a major investment in a new capability for existing gallery or museum models. ROI for existing galleries or museums is further complicated by the tendency to rotate exhibitions—a dedicated display space not in continuous use offers a relatively poor return.

[100] Government investment supporting arts and innovation might be understood as a reanimation of the frequently unrecognised role played by governments in the original development of many contemporary technologies during the twentieth century. Link: bit.ly/2RaqJdM

Serpentine R&D Platform & Rival Strategy

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