

## Representing Digital Collections

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### Introduction

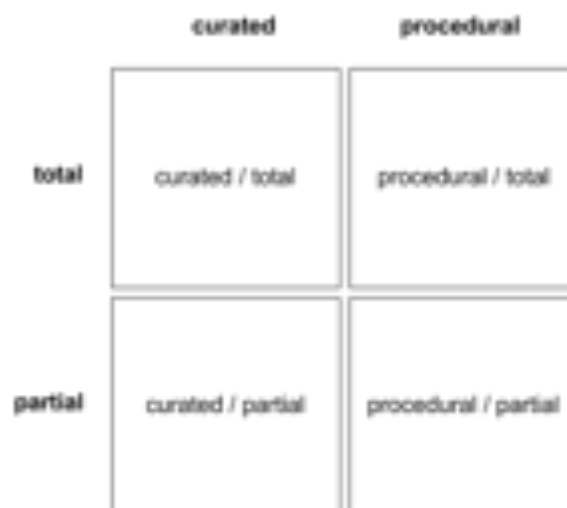
Digitisation takes in cultural collections - objects, documents, catalogs, indices - and extrudes data: records, files, and database entries. In figuring this process we typically imagine digital artefacts through manifestations that emphasise their continuity with their physical originals: the digital image resembles the museum object. This fidelity is both functional and reassuring; yet it is also highly questionable. For like all digital artefacts, the objects that emerge from digitisation are in fact nothing but data: abstract, structured patterns of difference, shuttling between storage and display media. As data, the digital object has no intrinsic, tangible form. Our encounter with a digital object consists of a particular representation or rendering of that data; but other representations are always possible. In the field of data visualisation, the question (and process) of representing data is termed *mapping*; the map is a specific relationship between an input (the data) and an output (the tangible form). But as the practice of visualisation shows, there is no necessary or intrinsic mapping. As Lev Manovich argues, when faced with complex data (such as digital collections), “designers and their clients have to choose which dimensions to use and which to omit, and how to map the selected dimensions” (Manovich, 2002). Moreover, mapping becomes a new political question: “Who has the power to decide what kind of mapping to use, what dimensions are selected; what kind of interface is provided for the user – these new questions about data mapping are now as important as more traditional questions about the politics of media representation.”

If digital collections are fundamentally datasets, then the question of mapping applies here too. We can regard all familiar representations - museum web sites or collection search interfaces - as specific mappings: selective and contingent representations of complex digital wholes; and we can analyse them as such. More interesting perhaps is that these mappings can always be otherwise; new representations are always possible. The abstraction of cultural collections into data offers expansive new opportunities for how we experience and use these collections. The significance of these representations is difficult to overstate, for as the digital collection becomes abstracted and intangible, its digital manifestation becomes our only point of contact. I will never walk the vaults of the Victoria and Albert Museum, inspecting ancient teapots; for me that collection exists only as I encounter it online. Thus how it appears

there - in Manovich's words, "what dimensions are selected" - is crucial. For cultural and collecting institutions, digital collections loom large, expanding their audiences while at the same time challenging traditional structures and practices (see for example Cameron and Mengler, 2009). Aaron Cope of the Cooper Hewitt museum has written recently of a shift underway, "from the exhibition being the principle unit of currency for an institution, to the entire collection being that measure." (Cope, 2013)

This chapter will consider current conventions and emerging practices in the representation of digital cultural collections, and locate all these within a simple analytic framework - a handful of conceptual devices that allow us to compare and contrast different representational techniques. The examples discussed here range across the digital collections of museums, galleries, libraries and archives, and include examples from - and analyses informed by - my own practice as a maker of collection interfaces and visualisations. My argument for the contingency of these representations - and that they can always be otherwise - is based on my own observations and experience in working with digital collections. In presenting this analytic framework, and considering some questions and challenges that arise, I want to argue for the potential of new forms of representation as well as provide tools for reading these forms critically.

As a starting point, and a schematic for the discussion that follows, I propose a "space" of collection representations with two axes. The horizontal axis describes process; how the representation is constructed. I will argue for a distinction between curated and procedural representations: between hand-crafted representations that reflect a curatorial intent; and procedural representations, generated through a formal (usually computational) process operating on the collection data. The vertical axis simply describes the scope of the representation; from partial, to total.



*Figure 1. A space of collection representations; the horizontal axis describes process, and*

*the vertical scope.*

## **From Curated to Procedural**

The distinction between curated and procedural representations echoes a well-worn binary in the digital humanities and digital media, between narrative and database. We can observe the tension between these terms playing out in the way digital cultural collections are framed and presented online. Typically, the collection appears within the context of an institutional website, where a common strategy is to introduce and contextualise the collection, as well as presenting featured items or recent acquisitions (see for example National Museum of Australia, “Collections”, n.d.). Often the collection is divided into subsets or areas that represent the collection as a set of themes or narratives (see for example Australian National Maritime Museum, n.d.). Contextual, descriptive or explanatory prose in a curatorial voice is combined with samples from the collection itself: items selected to represent the collection; visible parts of a larger whole that is only implied. These introductions are *curated* in process and *total* in scope; but constrained to broad generalisations and hand-picked exemplars, they are weak representations of the collection as a whole. Nonetheless they are significant in their introductory or framing role: the institutional curatorial voice leads us in.

At some point in all online collections, the mode shifts, and we encounter a *procedural* representation - what Alan Liu has termed a “data pour” (Liu, 2004). Liu used this term in the mid 2000s to describe how writerly web authorship was giving way to lists and tables of content built from live database sources. So too in the representation of digital collections, we find a transition from curatorial selection and the hand-authoring of web content, to the lists and tables generated from live collection data - that is, the digital collection proper. Search results are the archetypal procedural representation: here a (*partial*) list of collection items is generated by a formal procedure: a search algorithm operating over the collection database.

Current practice illustrates many different approaches to this boundary between the curated and the procedural, and corresponding differences in the way the digital collection is framed as a dataset. For example the National Museum of Australia deploys a thick layer of curated interpretive content around its digital collection, with dozens of thematic collection “highlights” - *partial curated* representations that each lead through to a (*partial procedural*) set of collection records (see National Museum of Australia, “Collection Highlights” (n.d.)). By comparison on the MoMA collections page prominent links to “painting” or “photography” lead directly to the procedural “data pour” of collection items; curated and interpretive layers are present, but less prominent (MoMA, 2013). One step further, the Walker Art Center’s Collections page - only a single click away from the institutional home page - is a

dense, browsable display of collection items (*partial procedural*); the curatorial layer has disappeared entirely and the collection data is left, here, to represent itself (Walker Art Center, n.d.; Figure 2).

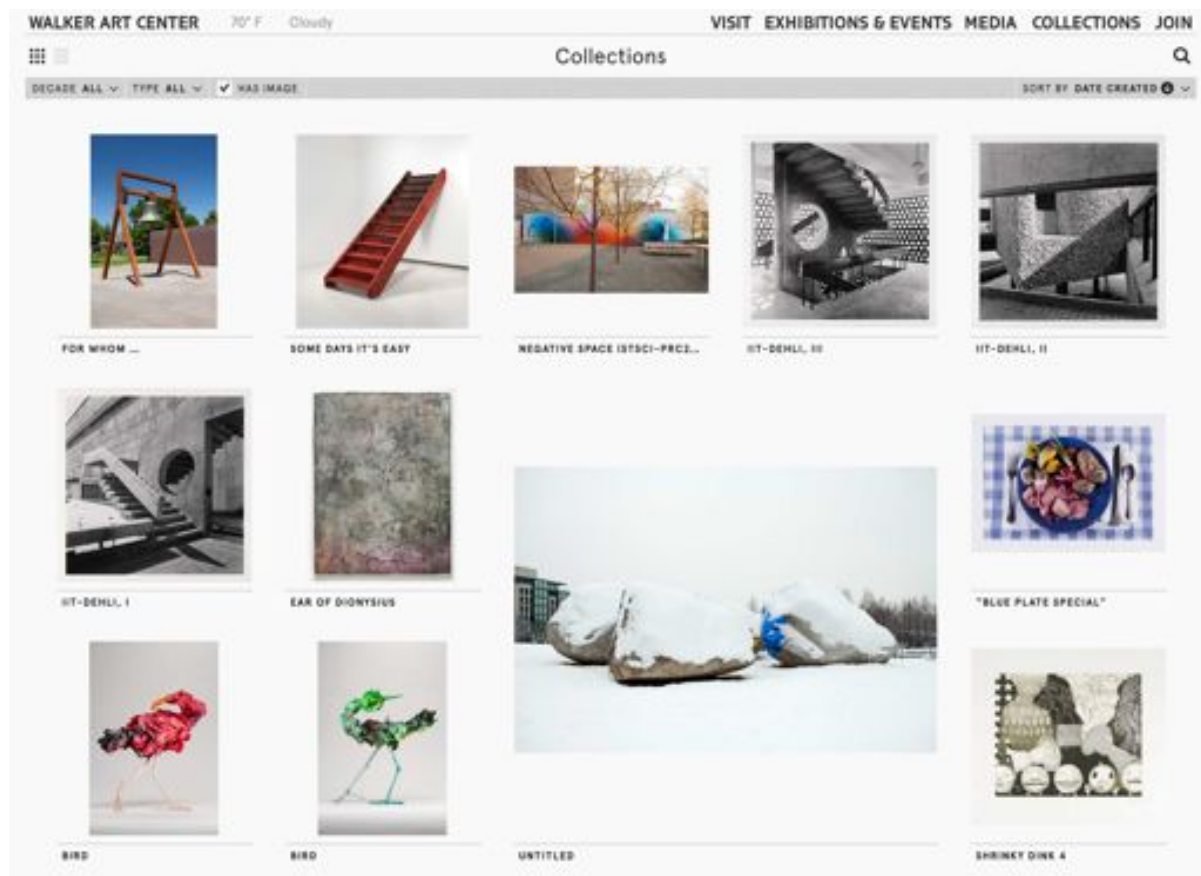


Figure 2: Walker Art Center Collections page.

### Procedural Representations: Search, Browse and Facets

Of course rather than some immediate encounter, this self-presentation is another site of representational contingencies. The conventional portals to digital collections are search and browse interfaces, each of which grapples with representation in different ways. We have argued elsewhere against the emphasis on search in digital collections (See for example Hinton and Whitelaw (2010)); for at its most basic, search interfaces simply do not represent the digital collection. The naked search box only prompts a query. The query in turn is an affordance for creating a representation - a set of results that offer an incomplete view of the collection (a *partial procedural* representation). Search here is a sort of representational horizon or threshold; the collection is only represented *after* search, and then only *through* search, and the contingencies of the relationship between the query, the structure of the collection data, and the search algorithm.

While such blank search pages still exist, most collections now provide some

contextual framing around search - typically a layer of curatorial mediation as described above. A more interesting strategy that has emerged recently is the procedural sample: the National Museum of Australia's otherwise conventional search page includes a small panel of thumbnails: forty randomly selected items from the collection, each a link to the full record (NMA, "Basic Collections search", n.d.). The Victoria and Albert Museum's collection search page does likewise (Figure 3, V&A, "Search the Collections", n.d.). These *partial procedural* representations provide both a visual microcosm of the diversity of the collection, and an invitation to further exploration.

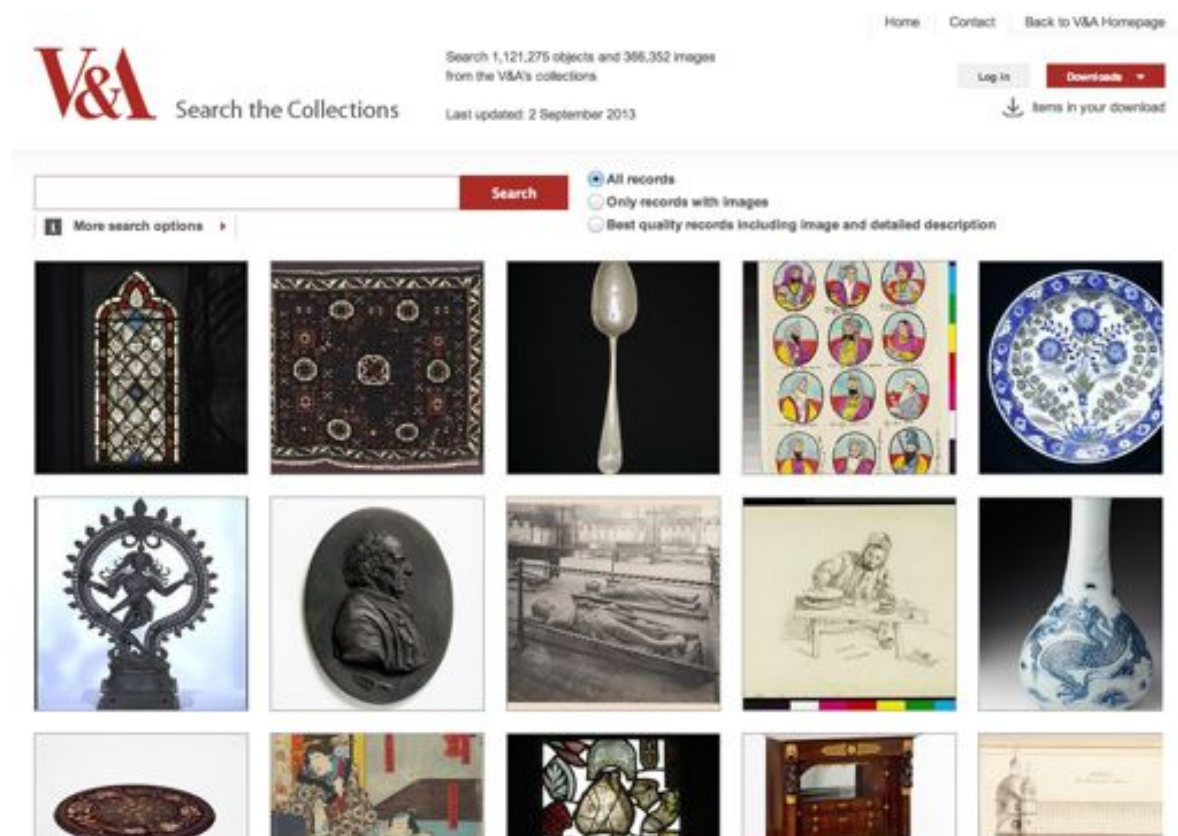


Figure 3. Victoria and Albert Museum, "Search the Collections" showing a partial procedural representation providing context for search.

Once over the threshold of search, the techniques used to present results also vary. The archetypal list, segmented into pages, is a meagre representation. It represents a portion of the collection, but also offers little by way of situating that partial slice within the larger whole, or even characterising the slice itself. Ironically however the presentation of search results in digital collections has also led the way towards richer, more comprehensive forms of representation. Faceted search uses specific metadata fields (or facets) to provide a procedural overview of the results of a search. The Victoria and Albert's collection search, for example, provides a breakdown of results into category, collection, material, place, subject and technique. These facets

are both qualitative - revealing the categories in the result set - and quantitative. While often framed as supporting the search paradigm - “refinement”, or the attainment of a desired “result” - facets are a dense, rich representation of some of the complexity and diversity that characterises digital collections. Almost by accident, they reveal navigable features of the collection (material, technique) that would not otherwise be apparent; in fact these are cues to the structure of the metadata shaping the collection. While the search results themselves are partial, facets represent the search results in a way that is *procedural* and *total*.

As a representational technique, facets are emerging as a bridge between search and browse-based approaches to digital collection interfaces. Traditionally browse interfaces have been unwieldy, multi-page lists. As the National Museum’s browse interface demonstrates, these listings can provide an evocative view of the collection (“Haberdashery, Hacksaws, Hair care equipment, Hair clippers...”); and in its entirety each browse view is a *total* and *procedural* representation of the collection (see NMA, “Collection search - Browse by object type”, n.d.). Yet while this interface provides hundreds of entry points to the collection, it offers no usable representation of the collection as a whole. By comparison the Art Gallery of New South Wales’ simple browse view is (roughly) hierarchical, dividing the entire collection into groups and sub-groups, including thumbnail samples and item counts (AGNSW, “The Collection”, n.d.). This simple device provides a compact but evocative overview that leads us directly into item-level listings of the works, and so also provides a navigable interface to the collection.

Increasingly, faceted approaches blur the distinction between search and browse modalities. MoMA’s browse interface presents a rich visual grid of works; like the Walker Art Center’s collection page, ordered reverse-chronologically (see MoMA, “MoMA | The Collection | Drawings With Images”, n.d.). The listing can be filtered by work type, department or decade, but the facets show no item counts. The facets here reveal some metadata structure, but not the shape or distribution of the collection. The Walker’s interface includes only two facets - decade and type - but in this case both show the quantities of works. In doing so the Walker’s display immediately reveals much more of the shape of the digital collection.

### **Show Everything - Total Procedural Representations**

Standard web-based representations of digital archives are unable to provide systematic, comprehensive views; and so cannot represent the collection as a complex, digital whole. Indeed the document-based paradigm of the web, combined with familiar search-and-browse interface models, simply lacks the representational language for such a view. However these familiar models are changing, and a range of

new forms are emerging that are better equipped to represent complex digital collections. The Circus Oz Living Archive site, developed by Reuben Stanton [x ref - Chapter?], exemplifies this shift. The culture and practice of interactive data visualisation is a significant influence here. Almost two decades ago Ben Shneiderman outlined a methodology well suited to exploring the multi-faceted data of digital collections; and he optimistically predicted that “the next generation of digital libraries... will enable convenient exploration of growing information spaces by a wider range of users.” (Shneiderman 1996) While Shneiderman’s prediction has perhaps failed to materialise, the approach embodied in his “visual information seeking mantra” has been widely adopted: “Overview first, zoom and filter, then details-on-demand”

Shneiderman’s “overview” is both a simple logical proposition and a fascinating representational challenge. How might we create an informative “overview” of a large digital archive? One approach to overview is echoed in the phrase “show everything” - an aphorism coined by San Francisco data visualisation studio Stamen Design (see Jones, 2009). Stamen’s ArtScope for SFMOMA (2009) is an early example of a *total procedural* collection representation (Figure 4; SFMOMA, “Explore Modern Art | SFMOMA ArtScope”, n.d.). ArtScope shows images of over 5000 works on a single giant, zoomable grid. Works are represented simply as images, and arranged by acquisition date, forming a rich, diverse mosaic. The literal “overview” here is striking; not merely more than a conventional web page, but different, for within this field we can immediately see patterns and structures: groups of related works, the distribution of tone, colour and even aspect ratio are all apparent. Stamen’s simple-minded motto, “show everything”, has complex outcomes; the collection presents itself as a dense and endlessly explorable visual field. Yet the matrix of structures and relationships that ArtScope reveals are also limited to this visual field. While we can navigate the grid using metadata or query, non-visual aspects of the digital collection (such as date) remain invisible. Thus this display demonstrates how overview must be translated in practice into a set of representational devices; despite the exhortation to “show everything”, visualisation requires choices that condition exactly what is shown, and how.



Figure 4. SFMOMA ArtScope, an early example of a total procedural collection representation.

My experiments in applying data visualisation techniques to digital collections illustrate the same pragmatic challenges, and further demonstrate the contingencies of representation here. The *Series Browser* represents the entire collection of the National Archives of Australia - some 65,000 archival series - in a graphical overview (Figure 5; for a full account see Whitelaw, 2009). The display shows the relative size, historical distribution, and provenance of these series, while more detailed provenance and series-to-series relationships are shown when focusing on a single series - a typical VIS “details on demand” or “focus + context” approach. The *Series Browser* demonstrates the feasibility of such an interface, but also how easily specific premises are “baked in” to procedural representations. Here an orientation based on quantity, size and chronology becomes the organising frame, while provenance and intra-collection relationships are relegated to “detail”. This relationship could easily be reversed; or different data represented (such as the “life span” of a series, for example). Given the complexity and scale of the data, these alternative views are unimaginable, until created. Creating such representations is a complex, embodied, self-structuring process of exploration - what Tom Armitage (2009) termed “toiling in the data mines” - rather than a rational or systematic endeavour.



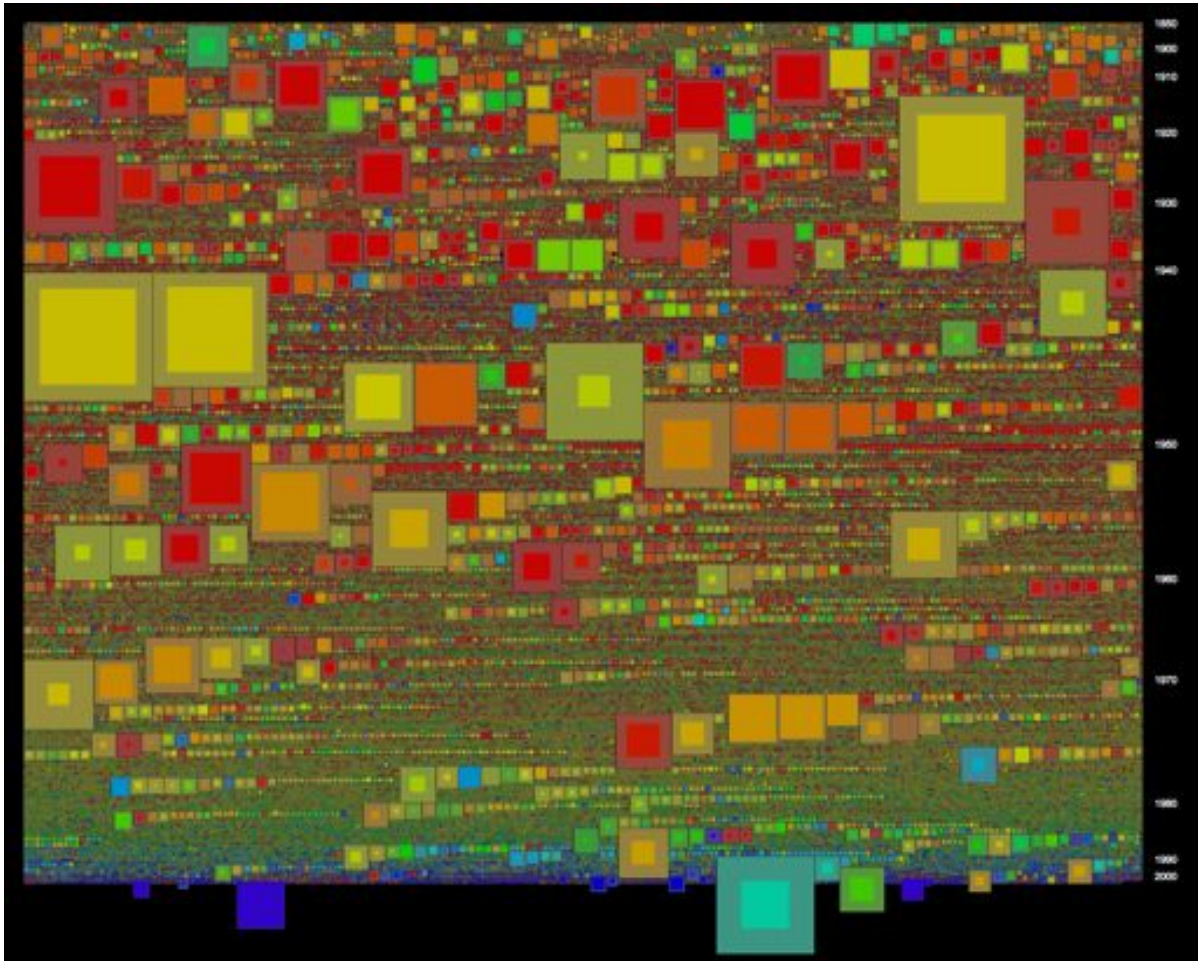


Figure 5. Mitchell Whitelaw, *Series Browser* (screen capture) (2009). A graphical overview of the collection of the National Archives of Australia.

The *Series Browser* tests the limits of visual and data-density for a single screen display. Interacting with this field is a challenge; in a collection of a hundred thousand or a million items, “show everything” is both technically and perceptually impractical. A traditional interface solution is to aggregate elements into groups, as in faceted search results. Similarly tag or word clouds create textual proxies for large groups of items; our *A1 Explorer* and *Commons Explorer* projects use clouds based on title terms to create compact overviews of large collections (See Hinton and Whitelaw, 2009). In atomising text into words, term frequency displays are a form of procedural decontextualisation - as Jodi Dean argues, “meaning is replaced by frequency” (Dean, 2009). In an attempt to stitch meaning back together, *A1 Explorer* and *Commons Explorer* show relationships between terms that occur in the same titles. These relationships, along with connections to item thumbnails, demand an active interpretation or inference of sense. The combination of text and image seems particularly evocative; we develop this technique in *Manly Images* (Figure 6; Whitelaw, 2012), where term-frequency and image displays are merged into a single structure - a mosaic of tiles that reveal both the size and content of groups within the collection. In fact each tile is a very slow slideshow, revealing its contents; the display

as a whole is a gradually shifting mosaic that portrays the range and character of the collection.

These techniques go some way to compensating for the loss that is implied in any representational “compression” of digital collections; they sacrifice exhaustive detail for a dynamic display that is both term cloud and systematic sample. However there is an intrinsic tension between the process of grouping like items, and the characteristic diversity of digital collections. As *Manly Images* shows, frequency-based clustering used in these projects works well to mark out the largest groups, but are far less effective at showing the “long tail” of the collection - the diverse oddities, outliers, or singletons. In *Manly Images*, groups with less than five items are simply swept into a single cluster of “others” - a crude technique that makes the long tail visible, but only at the expense of representing its diversity. There is a risk in these techniques that procedural representations promote the commonplace, and marginalise the unusual.

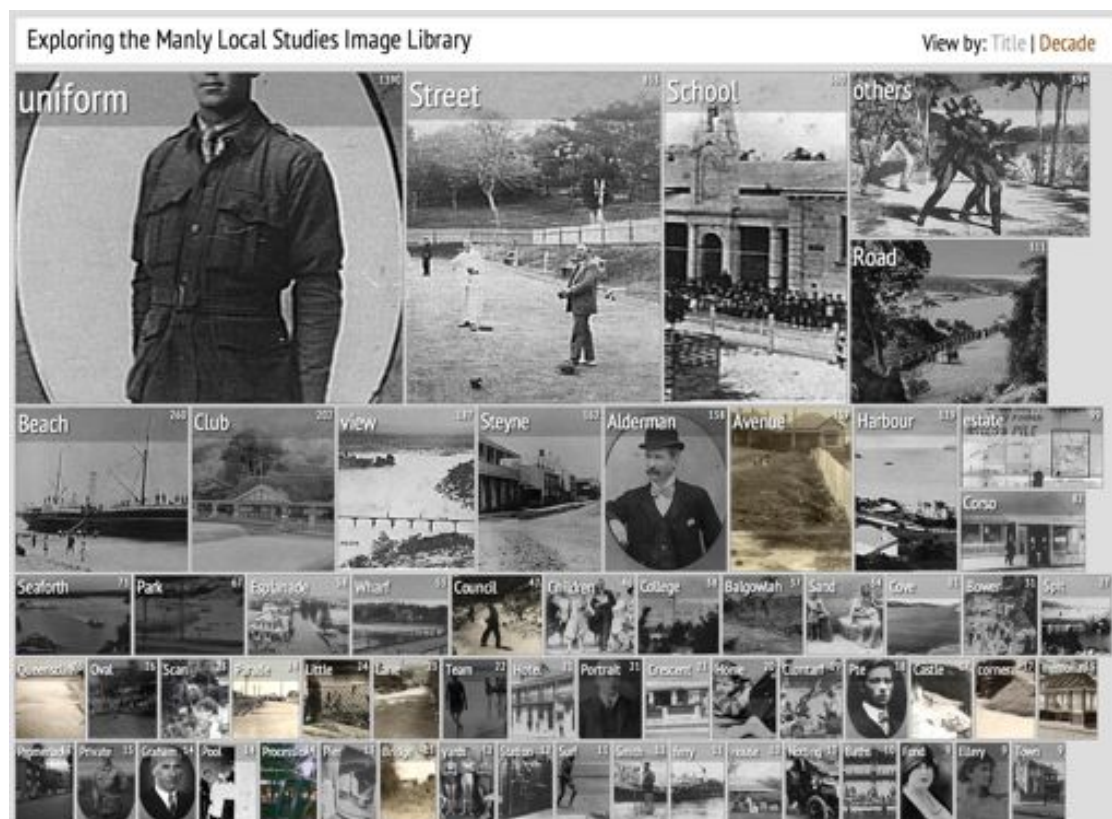


Figure 6. *ManlyImages* interface by Mitchell Whitelaw, showing the clustering of items by title term frequency.

If one of the challenges here is the contingency (and inevitable limits) of any single representation, one practical response is simply to multiply the representations. Joanna Drucker suggests as much in imagining web-based interfaces for scholarly interpretation that would “offer multiple views simultaneously.” Interpretation here is a process of “*moving through* a library or archive, rather than *looking at* the outline

or scheme of that space” (Drucker 2011, 17). Multiple views are a central device in the Circus Oz Living Archive site. It reveals the collection through clips, acts, stories and collections, and tailors the representational devices in each view (using timelines, tag clouds and lists). The result is a complex, richly interwoven portrait, rather than a single “overview”; as Drucker proposes, it invites us to *move through* the collection, exploring and interpreting. My own work with Ben Ennis Butler and the Australian Prints and Printmaking collection (2013) also demonstrates this approach, with three separate but linked views of a single large collection. Two separate but complementary overviews (focusing on artists and works respectively) are linked through a third, more immediate view that encourages the exploration of local connections within the collection.

In drawing on the techniques of data visualisation, these approaches may seem to bypass curatorial selection and narrative. While this may be possible, it is certainly not assured; rather, I would argue that systematic representations are cultural products, reflecting specific cultural discourses. Consider the digital representations of MoMA’s 2013 exhibition *Inventing Abstraction* (see MoMA, “Inventing Abstraction”, 2013) . The central artefact here is a network diagram, mapping documented relationships between the artists featured in the exhibition (Figure 7). This diagram is in part a conventional (and engaging) interactive visualisation. It provides a complex but legible overview of the artists and their relationships; its layout reveals highly connected “clusters” and subgroups, and it highlights highly connected “key” individuals. Selecting an artist reveals further information, including artworks and in some cases a curatorial narrative.

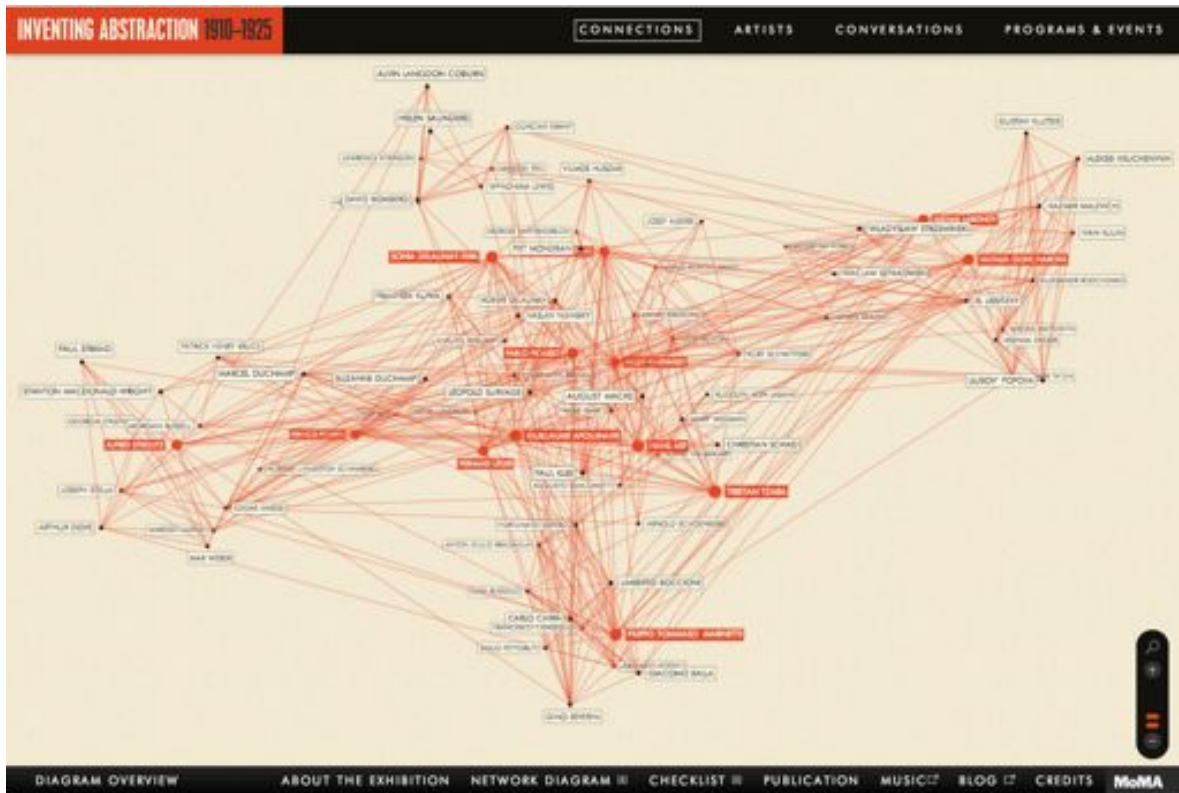


Figure 7. Connections diagram from MoMA's *Inventing Abstraction* (2013).

This diagram can equally be read, however, as a strongly historical and discursive construction. As the curators and designers explain, the diagram references Alfred Barr's 1936 diagram, produced for MoMA's *Cubism and Abstract Art* exhibition of the same year (See MoMA, "Behind the Scenes", 2013). Barr's diagram is a flowchart, not a network graph, and it shows a genealogy of art movements that ultimately give rise to geometrical and non-geometrical abstract art. In referring to Barr's diagram and MoMA's own 1936 exhibition, this diagram suggests both its own notion of genealogy - figuring the institution itself in a prominent role - and a revision or updating of Barr's analysis. In transforming the flowchart into a network diagram, MoMA self-consciously updates Barr, adopting a contemporary trope for the representation of complexity. This trope is more than a visual schema; as curator Leah Dickerman explains, "a primary thesis of the show is that abstraction is about relationships." The network is a conceptual model and curatorial premise, informed no doubt by the rise of network thought and discourse; this premise is then literally realised in the network diagram, which functions both as a visualisation and a cultural performance.

### Openness and Seamfulness; Gaps and Edges in Digital Collections

We need not work "against the grain" for this reading of MoMA's visualisation; their curatorial and design processes are documented online. The representation exposes (in part) its own construction, and in the process reminds us of its contingencies and

conditions, what is shown and not shown. Given the inevitability of the mapping problem - the contingency of any digital representation - this openness is a vital attribute. Chalmers' notion of "seamful" design is useful here: the space of mapping - between the digital collection (as data) and its representation - is a "seam" or join between heterogeneous domains (see Chalmers and Galani, 2004). Chalmers critiques the tendency of digital media to conceal or efface these boundaries in the interests of the "user", arguing that in fact these seams offer useful affordances. When it comes to creating representations of our cultural heritage, I would argue that seamfulness is also an ethical and political stance - a view on how the (technical, cultural, and institutional) constitution of these representations should be exposed.

The representation of missing data - especially missing images - offers a useful illustration. With the cost of digitisation and the strictures of copyright law, images are often unavailable. Practices in the representation of these gaps vary, from exposing the gap (with a "no-image" placeholder image), to minimising it; for example both MoMA and Walker Art Centre default to show only works with images. Cooper Hewitt Museum offers a more seamful contrast, with three different no-image placeholders for undigitised, digitised but lost, or digitised but rights-restricted records (Cope, 2013). Cooper Hewitt's "Albers mode" experiments go a step further, and use the no-image placeholder to show item metadata; these seek to provide "a language ... by which people can explore the collection in the absence of pristine records".

Seams in digital collections also take the form of boundaries or edges, which may be either revealed or effaced. Some *partial curatorial* representations actually conceal their partiality; for instance both the National Gallery of Australia's thematic collection pages (see NGA 2013), and the Rijksmuseum's thematic entry points (see Rijksmuseum, "Watches" n.d.) elide their relationships to the wider collection. For example, try to navigate from the Rijksmuseum's watches page to a listing of all watches in the collection. Beyond the scale of the institution, these boundaries become more complex; for example the Google Art Project has selectively digitised works from hundreds of collections, but this representation elides the relationship between its own partial sample and the whole collection from which it is sourced. Federations and aggregations - such as Google Art Project, Europeana, or Trove - are premised on a "seamless" functional integration of diverse digital collections, as well as a narrative of totality and scale; but how might they seamfully represent their own limits, edges or internal gaps? For example Google Art Project can show me superb images of works by Arthur Boyd, drawn from multiple collections: but it cannot represent the huge mass of Boyd's other work, even in the collections represented here (see Google Cultural Institute, n.d.). Linked data initiatives such as LODLAM hold great promise for making these invisible contexts more legible, but if current practice is any guide seamful representations will always be required.

## Conclusions

The question of representation is critical in the digitisation of culture and its materials; for if culture is now data, then our encounter with it is entirely shaped by the choices we make in representing that data. Framed in this way, both traditional and experimental representations of digital collections can be considered side by side, as contingent and selective mappings of abstract, complex datasets into concrete displays. The *curated / procedural* and *partial / total* axes provide some provisional terms for organising and comparing these representations. Emerging practices are demonstrating the potential of new procedural techniques, informed by data visualisation; there is a general trend here towards denser, richer displays, with new affordances for analysis, encounter and exploration. I would argue that these displays can improve in many ways on traditional web interfaces; but this is not to say that large scale procedural representations can “solve” this “problem”. All these artefacts are made, first and foremost; shaped by cultural practices and technological choices, institutional agendas and narratives, and constrained by the pragmatics of digital representation. If this is, increasingly, how we will encounter the artefacts of our culture then it is crucial that we keep sight of how these representations are constructed.

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