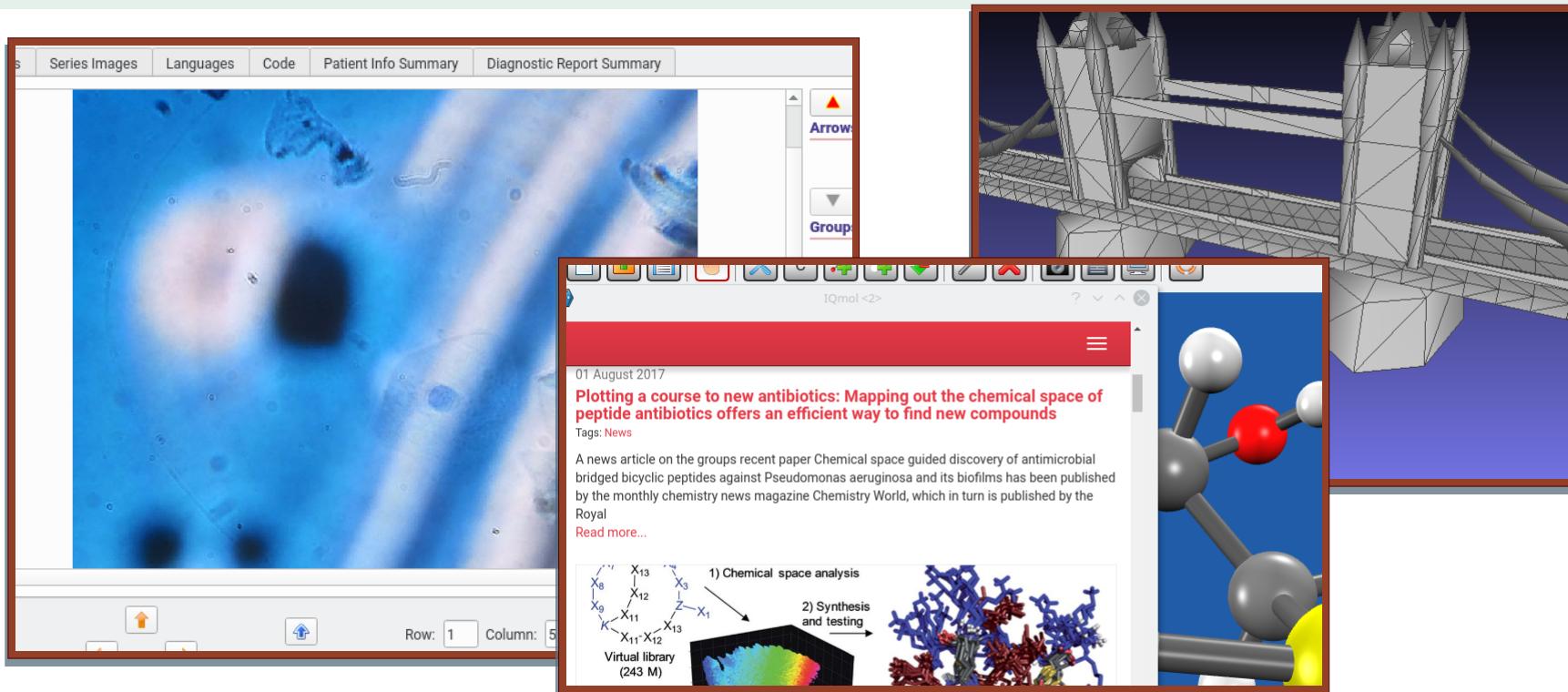


The NCN/A3R ("NA3")

Native Application Development Framework



Linguistic Technology Systems

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The NCN (Native Cloud/Native) Protocol

Cloud/Native Components as back-ends for native software

- Our “Native Cloud/Native” protocol refers to native application front-ends paired with Cloud/Native (back-end) container instances.
- Allows sharing of code libraries and data representation across both endpoints.
- Common representation on both server- and client-side streamlines network communications (no need to marshal data between different formats).
- The NA3 technology can be ported to other application frameworks apart from Qt (wxWidgets, XCode, MFC, etc.). This presentation will focus on NA3’s default Qt implementation.

How Cloud Back-Ends Enhance Native Front Ends

- Cloud Backup; Share Data between Users; Collaborative Editing
- Maintain users’ application state across different computers (home/school/office)
- Upgrade running applications without a need to re-compile

“Application-As-A-Resource” (A3R)

The A3R Application Model

- A3R Applications are self-contained, citable resources which can conform to modern resource documentation standards, such as the Research Object protocol.
- A3R Applications can use Hypergraph-structured metadata to describe data types, procedures, User Interface features, and inter-type relationships (for instance, the relation between data types and the types of GUI components which visualize them).

A3R Developer Tools

- Hypergraph-based data modeling and serialization.
- Framework for building custom scripting, parsing, and data persistence engines.
- Enhanced support for applications specifically designed to access research data sets.
- Convenient framework for sharing data among applications (to establish inter-application workflows) or between applications and cloud or web services (including leveraging “NCN” services).

Qt is the most popular native, cross-platform application-development framework.

- ◆ ~1 million active developers
- ◆ Over 5,000 client companies
- ◆ Worldwide “Qt Partners” Ecosystem
- ◆ ~US \$250 million overall market

However ... Limited Qt Cloud Integration Support

- “Qt Cloud Services” Discontinued in 2016.
- Currently there is no standard model for accessing Cloud services from Qt applications.
- Nor is there a standard Qt-based Cloud/Native container architecture.

Example Use-Cases

Inter-Application Networking and Workflow Management

- Export data and instructions between Qt-based applications (slides 6-7).
- Embed document or multi-media viewers inside scientific or dataset applications (slides 18-21).

Responsive desktop-style applications for enhanced UX

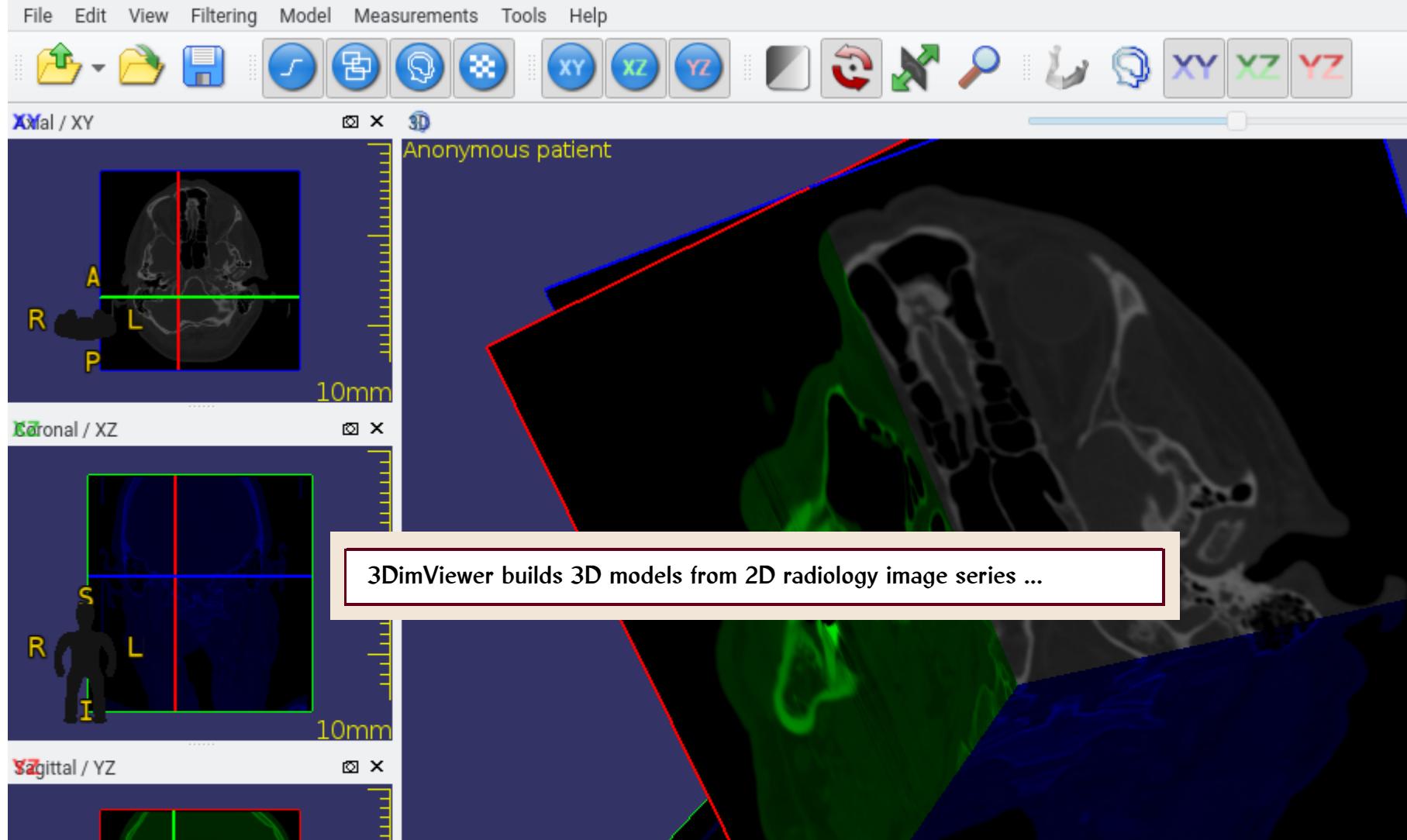
Native applications offer superior User Experience, leveraging distinct interactive features of desktop GUIs: context menus, dialog boxes, tool tips, Multiple Window Display, dock windows, and so on:

- Compelling front-ends for e-commerce, Real Estate, VR, etc. (slides 11-17).
- For scientists and researchers, build innovative data-collection instruments as well as interactive Research Object applications (slides 8-10).

An Example of Inter-Application Networking

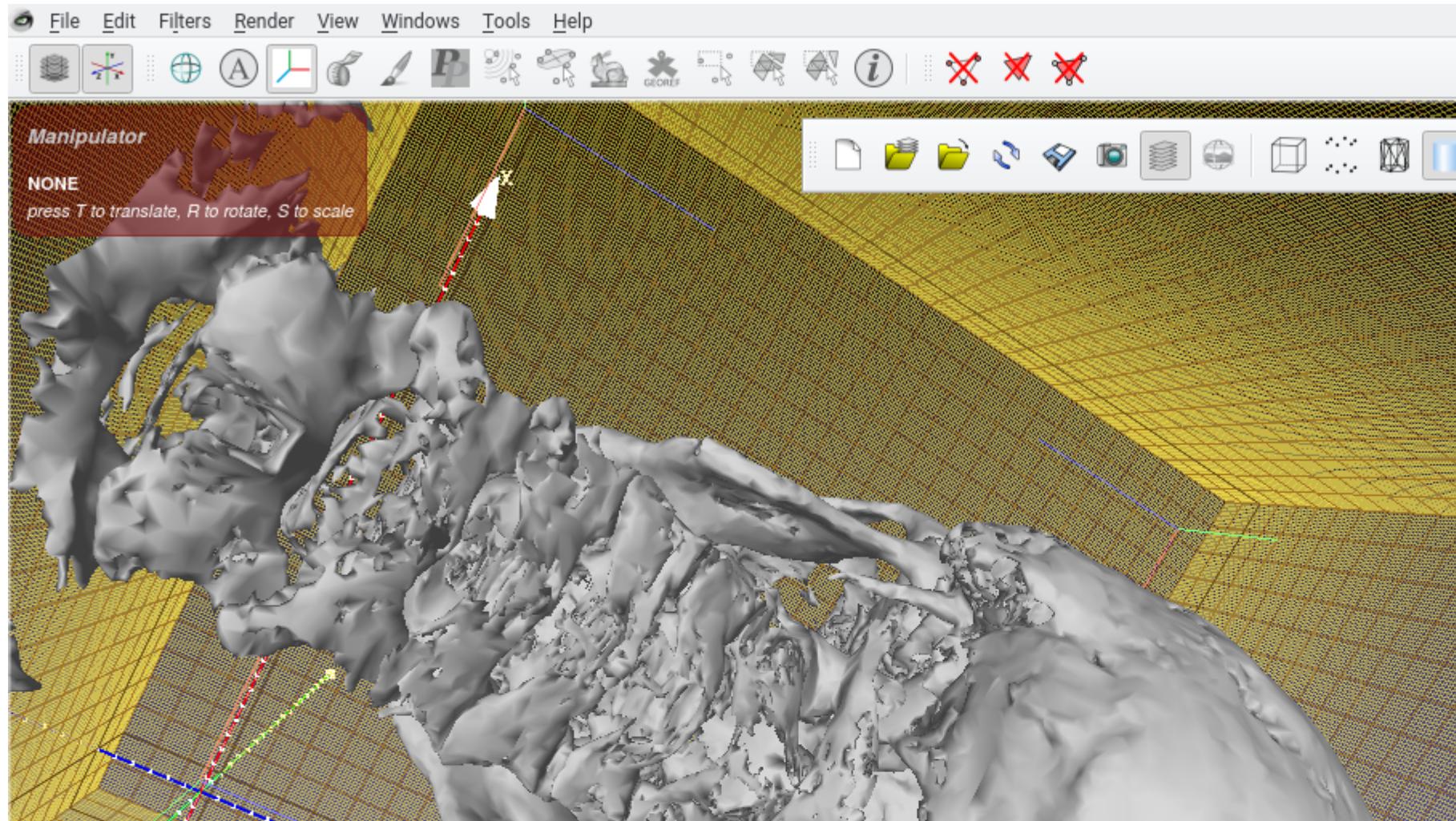
Research S
Research Slide 2
Research Slide 3
Research Slide 4
Research Slide 5

This slide and the next demonstrate a case-study where inter-application data sharing enhances the capabilities of two applications: 3DimViewer (a radiology tool) and MeshLab (a 3D graphics engine).



3D Graphics Sent to MeshLab

... Once the 3D tissue sample is constructed by 3DimViewer's algorithms, an A3R inter-application networking protocol (implemented as an extension to both applications) allows 3DimViewer to export the model to MeshLab so that it may be studied in a more comprehensive 3D viewing environment.



A3R Applications as Data Collection Instruments

Research S
Research Side 2
Research S
Research Side 4
Research Side 5

Forms Web Language Help About

Save Form Open Form Cloud Save Cloud Open Submit Form

Page: 0 Search for: Forwards

ndp-main-outline <5> ? ^ X

Welcome Web

X ? ^ X

Form Outline

Click on a subheading to continue

Patient Information

Chief Complaint

Review of Symptoms

Treatment History

Medical History

Current Medications

Family History

Referring Doctor: Dr. New Test

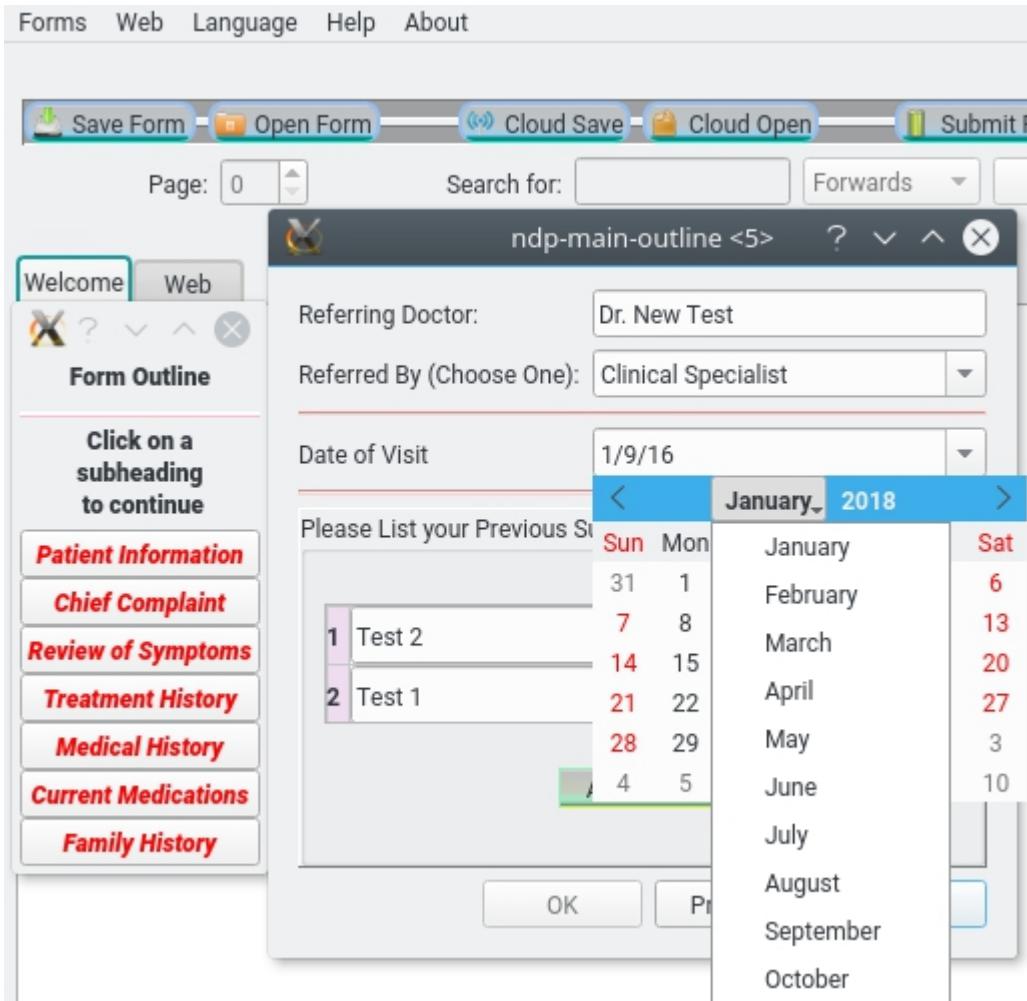
Referred By (Choose One): Clinical Specialist

Date of Visit: 1/9/16

Please List your Previous Stays

1	Test 2	Sun	Mon	January	Sat
		31	1	February	6
		7	8	March	13
		14	15	April	20
2	Test 1	21	22	May	27
		28	29	June	3
		4	5	July	10

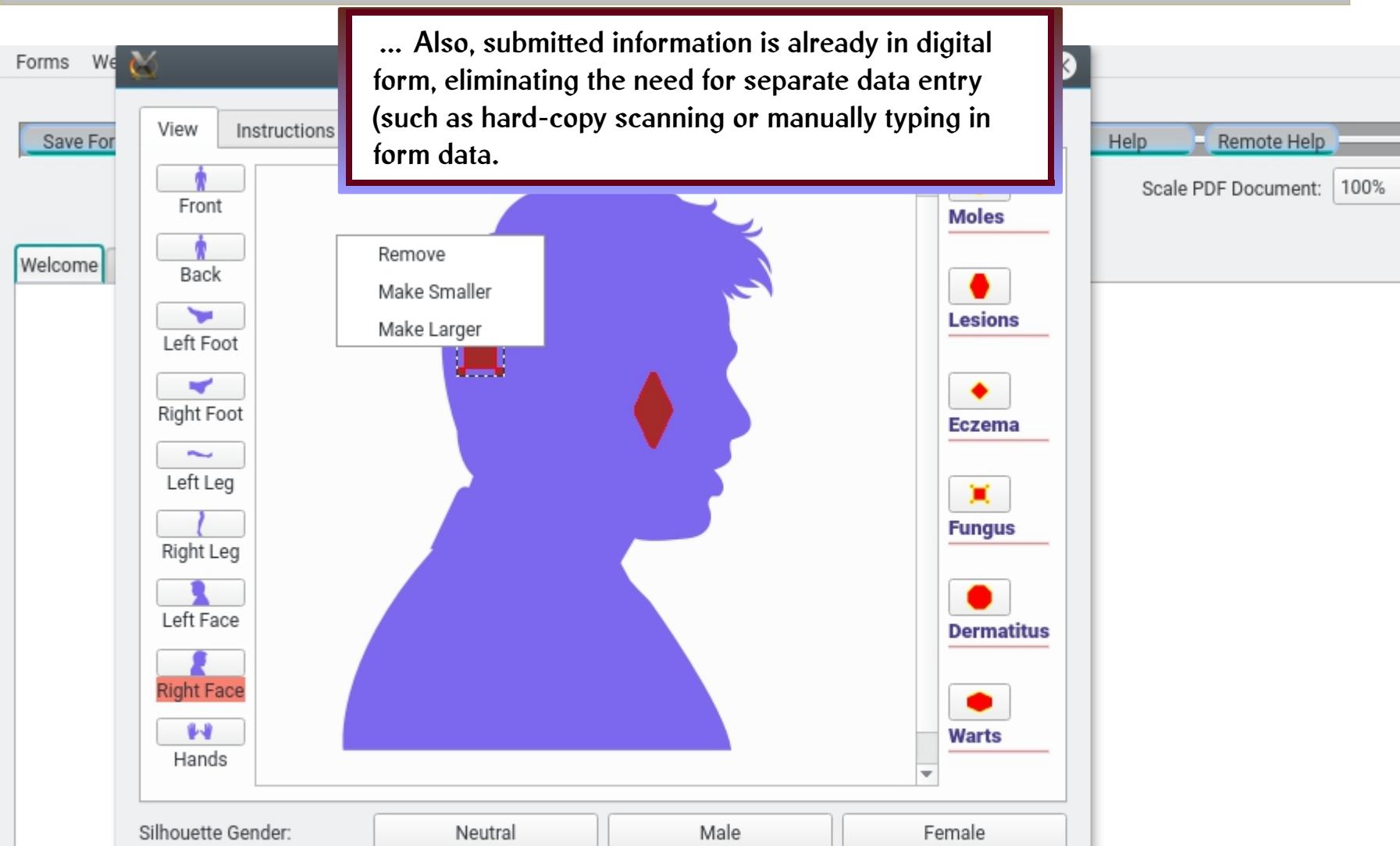
OK Print



In medicine and social science, “data collection instruments” (DCIs) refer to surveys, questionnaires, and other tools to obtain human feedback.

Qt-Based Interactive Forms

Data Collection Instruments implemented as native desktop applications can have easily navigable, interactive forms that make it simpler for people to provide information ...



A3R Applications as Research Objects

Complementary to A3R components which facilitate *obtaining* research or experimental data, A3R “Data-Set Applications” are also powerful tools for visualizing and analyzing research findings.

Data-Set Applications are “Research Object Bundles” — combinations of code and data, providing access to data sets without the need for external software dependencies.



The interface includes a navigation bar with tabs: View, Instructions, Series Images, Languages, Code, Patient Info Summary, and Diagnostic Report Summary. On the left is a vertical stack of thumbnail images. On the right are toolbars for Arrows, Comments, Lists, Arcs, and Rulers. At the bottom are controls for Silhouette Zoom, Image Transforms, Annotations Transforms, and buttons for Pan, Zoom, and Slide.

Native Applications as Interactive Catalogs

E-Commerce
Slide 1

E-Commerce
Slide 2

E-Commerce
Slide 3

E-Commerce
Slide 4

E-Commerce
Slide 5

E-Commerce
Slide 6

E-Commerce
Slide 7

As a case-study in enhanced User Experience afforded by native applications, consider how static PDF catalogs and brochures can be turbo-charged into engaging, interactive software-based presentations.

The screenshot shows a native application interface for a shoe catalog. On the left, there is a sidebar with small thumbnail images of other shoes. The main area features a large image of a brown leather lace-up sneaker with a white sole. A context menu is open over the shoe, with the 'Detach Everything' option highlighted in blue. Below the main image, there are navigation controls for item selection (Item: 3) and image zoom. At the bottom, there are tabs for 'Overview', 'Features', 'Specs', and 'Reviews', with 'Overview' currently selected. A list of product features is displayed: 'Leather upper', 'Lace-up', and 'Round toe'. To the right of the main image, there is a detailed product description for the 'Grand Crosscourt II Sneaker' and a section for 'Actions' with links to 'Add to Cart' and 'Explore Colors'. There are also two small color swatches for the shoe's color options.

Detach Image
Detach Noteboook
Detach Description
Detach Everything
Merge Windows
Explore Color Matches ...
View 3D Model ...
Take Screenshot
View Item List
View Shopping Cart

Grand Crosscourt II Sneaker

Sleek and simple, the Grand Crosscourt II sneaker from Cole Haan is the perfect way to add some tailored casual style to your every day look!

Actions:

- [Add to Cart](#)
- [Explore Colors](#)

Item: 3 Image Zoom:

Overview Features Specs Reviews

- Leather upper
- Lace-up
- Round toe

Interactive Shopping Carts

Instead of static lists, shopping carts can be made into multi-dimensional, multiple-window interactive displays.

The screenshot illustrates a multi-dimensional, multi-window interactive display for a shopping cart. At the top, a navigation bar includes File, Email, Events, APIs, Web, and Broadleaf. Below it is a toolbar with Page: 0, Search for:, and a zoom control at 100%. The main interface shows a grid of flower images, with two products displayed in detail windows.

Product Window 1 (Left):

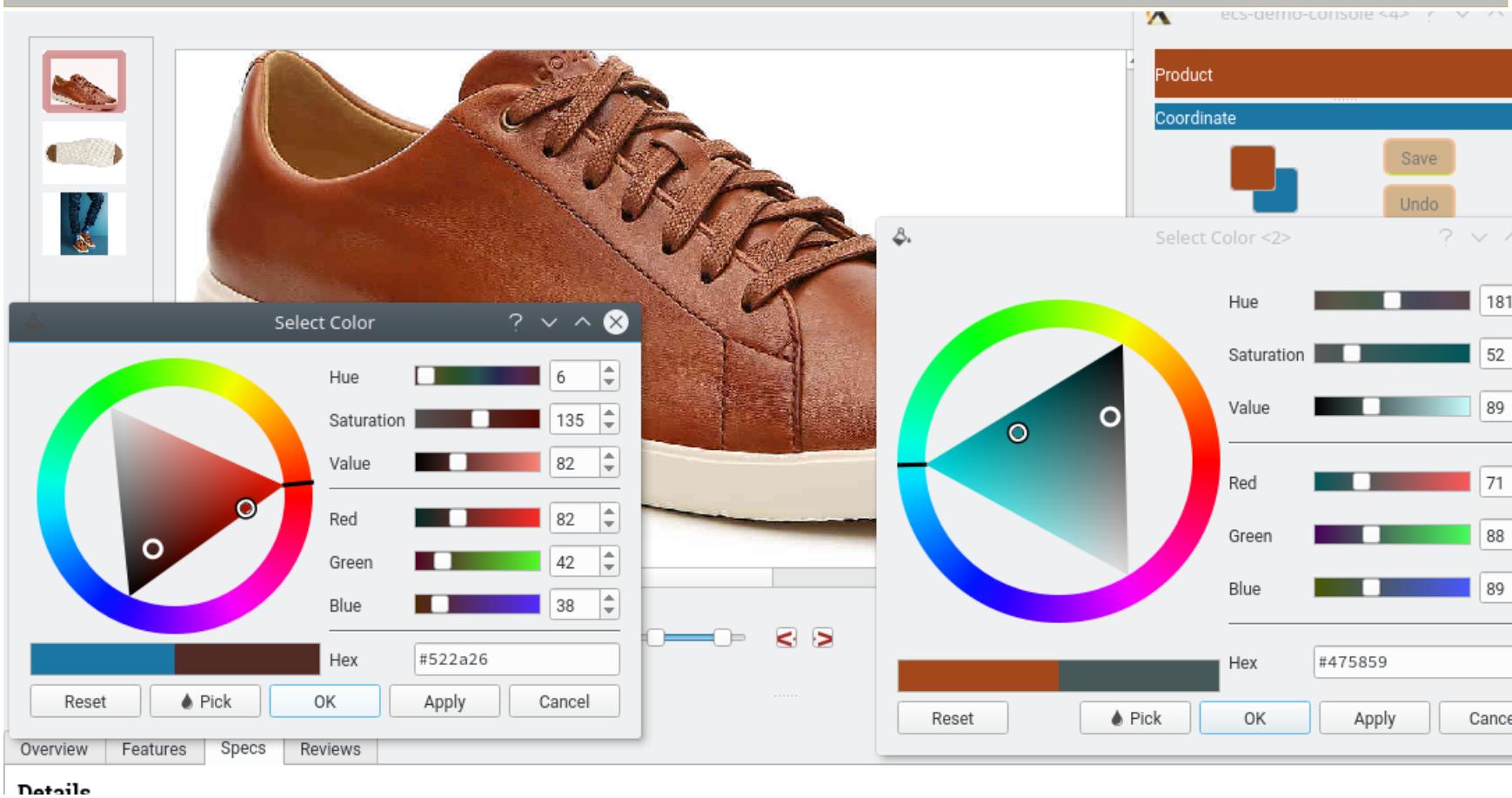
- Product ID: tec5-db-main <2>
- Product Name: Lily Garden Silk Peony Bouquet
- Description: Home Decoration, Lilac, 18 Inches High
- Image: A bouquet of purple peonies and greenery.
- Buttons: Overview, Specs, Reviews, Q & A, OK, Cancel.

Product Window 2 (Right):

- Product ID: tec5-db-main <3>
- Product Name: Frosted Hydrangea, Mauve
- Description: 32 Inches High, 12 Floral Sprays
- Image: A large bouquet of mauve hydrangea flowers.
- Buttons: Overview, Specs, Reviews, Q & A, OK, Cancel.

Explore Products with Native Software

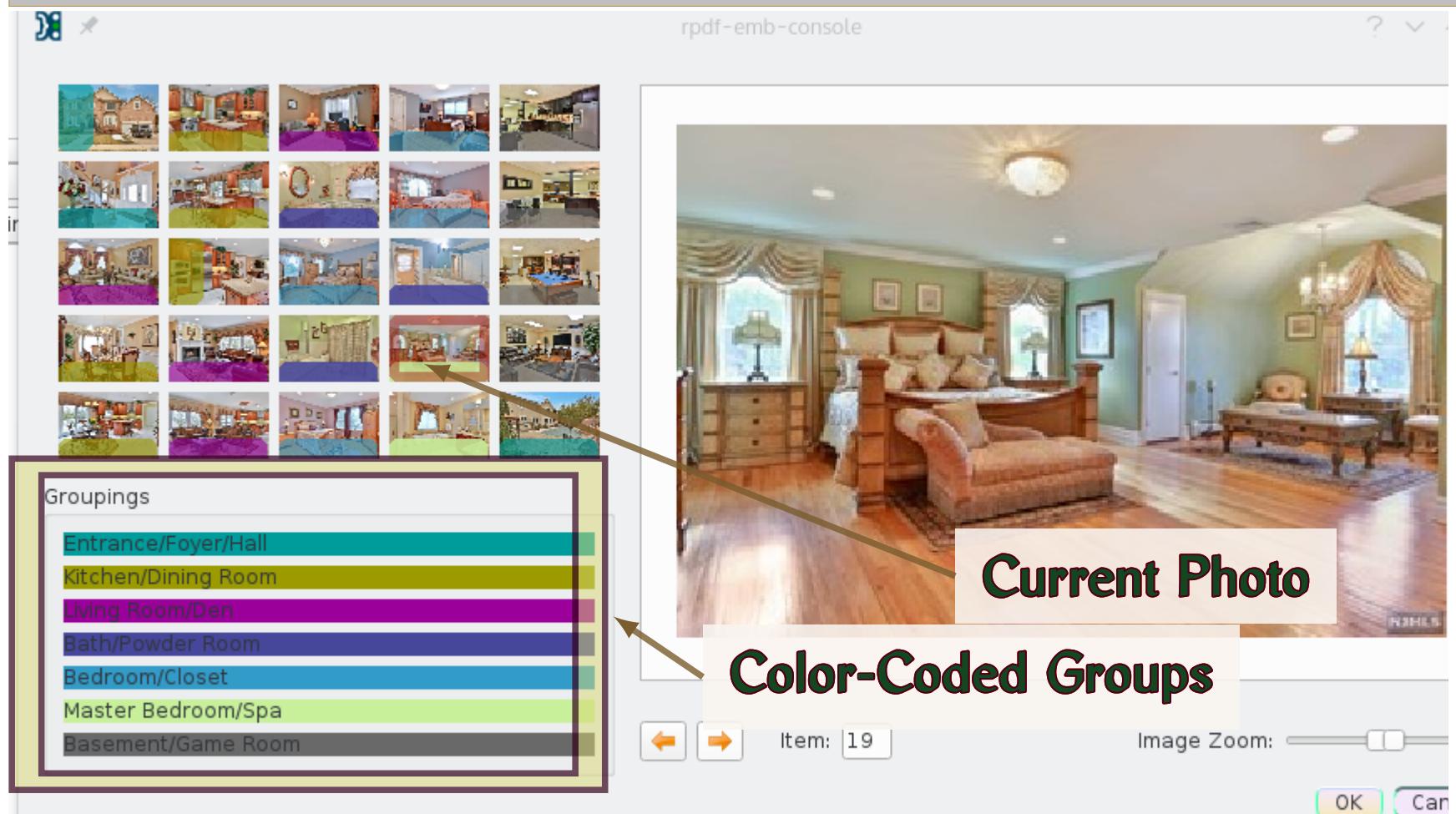
Interactive catalogs allow designers to incorporate many unique features and capabilities of desktop applications, such as using HSV color-wheel controls to explore color coordination while shopping.



Interactive Real Estate

E-Commerce
Slide 1
E-Commerce
Slide 2
E-Commerce
Slide 3
E-Commerce
Slide 4
E-Commerce
Slide 5
E-Commerce
Slide 6
E-Commerce
Slide 7

A3R programming can also bring enhanced UX to Real Estate presentations: instead of just groups of photos, properties can be displayed via interactive, multi-dimensionally organized, color-coded photo viewers.



The screenshot shows a software interface for viewing real estate photos. On the left, a grid of thumbnail images represents different property types. On the right, a large image of a bedroom is displayed with a callout box labeled "Current Photo". Below the main image, a title "Color-Coded Groups" is shown with an arrow pointing to a sidebar. The sidebar, titled "Groupings", lists categories with corresponding color-coded bars: Entrance/Foyer/Hall (teal), Kitchen/Dining Room (olive green), Living Room/Den (purple), Bath/Powder Room (dark blue), Bedroom/Closet (blue), Master Bedroom/Spa (light green), and Basement/Game Room (gray). Arrows point from the sidebar to the current photo and the main grid of thumbnails.

rpdf-emb-console

Groupings

- Entrance/Foyer/Hall
- Kitchen/Dining Room
- Living Room/Den
- Bath/Powder Room
- Bedroom/Closet
- Master Bedroom/Spa
- Basement/Game Room

Current Photo

Color-Coded Groups

Item: 19

Image Zoom:

OK Cancel

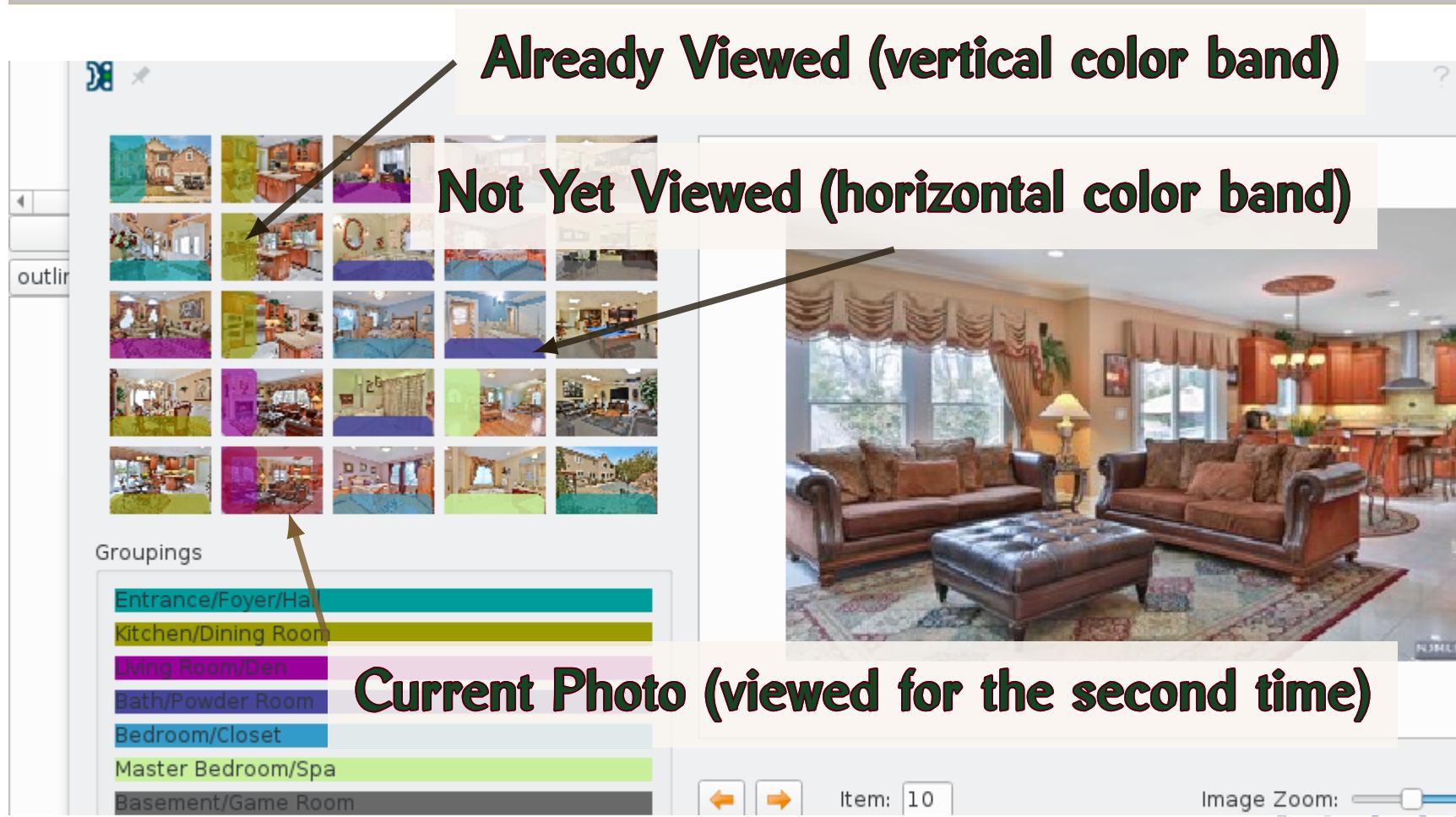
Photo Viewer Interactive Cues

These slides demonstrate visual cues to aid photo navigation, such as color bands (overlays) that switch from horizontal to vertical indicating which photos have already been viewed; and the thumbnail of the current viewed photo marked with a thick colored border (surrounding the thumbnail photo and its overlays).

Already Viewed (vertical color band)

Not Yet Viewed (horizontal color band)

Current Photo (viewed for the second time)



Groupings

- Entrance/Foyer/Hall
- Kitchen/Dining Room
- Living Room/Den
- Bath/Powder Room
- Bedroom/Closet
- Master Bedroom/Spa
- Basement/Game Room

Item: 10

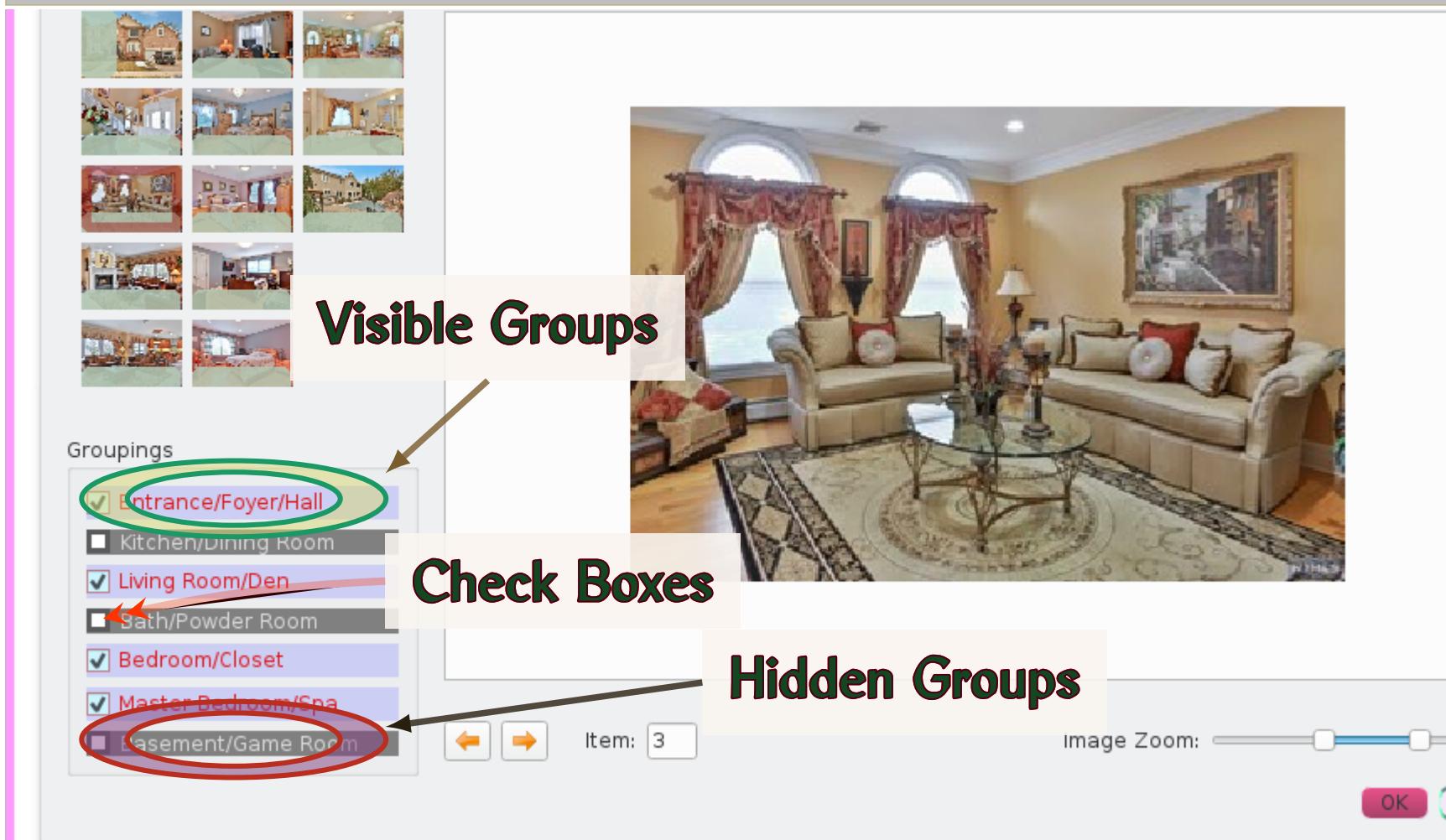
Image Zoom:

February 10, 2020

15 / 22

Filtering Photos

Another feature which may be conveniently implemented in A3R-style photo viewers is a filtering option, which — given a collection of pictures classified into several groups — allows users to show or hide photos based on the group they belong to (note the check-box buttons on the group listing).

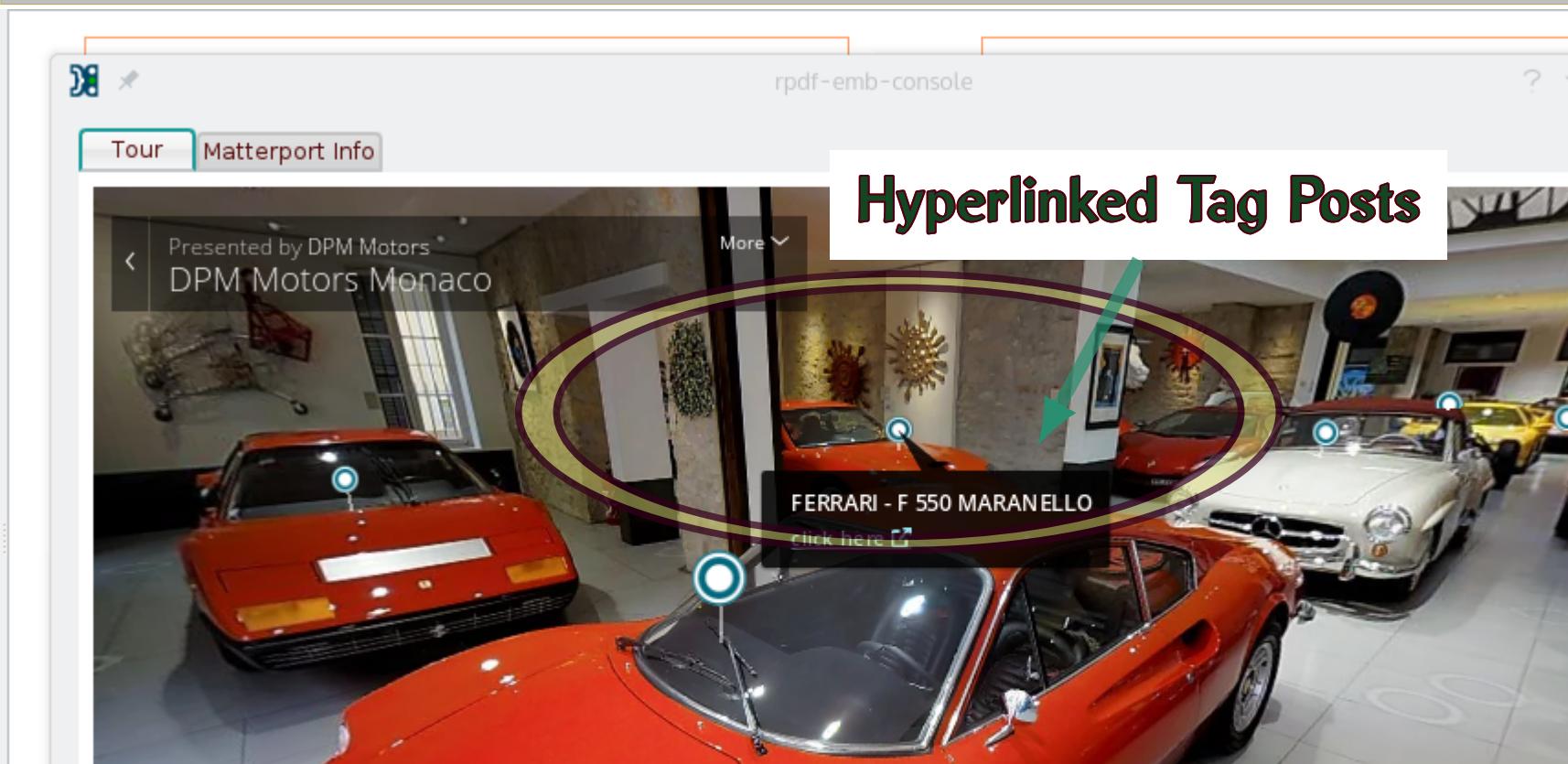


The image shows a screenshot of a photo viewer interface. On the left, there is a grid of thumbnail images representing different rooms. In the center, a large image of a living room is displayed. On the right, there is a control panel with the following elements:

- Visible Groups:** A label with an arrow pointing to the "Entrance/Foyer/Hall" checkbox in the list below.
- Check Boxes:** A label with an arrow pointing to the "Sath/Powder Room" checkbox in the list below.
- Hidden Groups:** A label with an arrow pointing to the "Basement/Game Room" checkbox in the list below.
- Groupings:** A list of room categories with checkboxes:
 - Entrance/Foyer/Hall
 - Kitchen/Dining Room
 - Living Room/Den
 - Sath/Powder Room
 - Bedroom/Closet
 - Master Bedroom/Spa
 - Basement/Game Room
- Navigation:** Two small orange arrows pointing left and right.
- Item:** A box showing "Item: 3".
- Image Zoom:** A horizontal slider with a blue track and white markers.
- Buttons:** A purple "OK" button and a green "Cancel" button.

Interactive VR: Hyperlinked Tag Posts

Another emerging technology, relevant to both e-Commerce and Real Estate, is the use of Panoramic Photography to create immersive Virtual Reality scenes. Panorama-Photography-based VR engines, like Matterport, allow “tag posts” with embedded hyperlinks, which in a native-application context become channels of communication between the VR renderer and the host application. The full capabilities of this interactive modality — combining VR with clickable links and text “bubbles” — can only be fully realized via Virtual Reality engines (such as WebGL) embedded in native software.



A3R Document Viewers

Publishing
1
Publishing Side
2
Publishing Side
3
Publishing Side
4

A3R applications may embed viewers for document formats such as e-Pub, HTML, and PDF; then supplement conventional publications with special components customized for individual manuscripts: e.g. (as in this case), a widget allowing readers to visually explore patterns in classical Indian music.

The sidebar includes icons for settings, library, and reading, and buttons for HTML Source, Lisp, CSS, and XML. Below these are links for 'Article view' and a search bar with a magnifying glass icon.

ANTHROPOLOGY AND HUMANISM

[Explore this journal >](#)

Ethnographer as Apprentice: Embodying omusical Knowledge in South India

da Weidman

Published: 26 December 2012 [Full publication history](#)

The viewer interface shows a top bar with 'Display Tala Types: Jhoomra/Dhamar (14 beats)'. Below is a large rectangular area divided into 14 horizontal slots, with some slots colored red, purple, and green. Below this is a 'Patterns' section with a slider from 'Pattern 1 (3-4-3-4)' to 'Pattern 2 (4-4-4-2)'. A 'File' input field shows the path '/extension/ScignSeer/articles/svg/tala.svg'. At the bottom right are 'Proceed' and 'Cancel' buttons.

Volume 37, Issue 2
December 2012
Pages 214-235



A3R Document Viewers as Embedded Components

Document Viewers may also be embedded in host applications which provide domain-specific visualization capabilities. For example, chemistry papers might be viewed within IQmol (a Qt-based program for molecular visualization and physical/chemical analysis) via an A3R document-viewer plugin.

The screenshot shows a chemistry application interface. At the top is a menu bar with 'Display', 'Build', 'Calculation', 'SONIC', and 'Help'. Below the menu is a toolbar with various icons. A context menu is open over a 3D molecular model, showing options like 'Configure', 'Select All', 'Reperceive Bonds', 'Duplicate Geometry', 'Atomic Charges', and 'Remove'. The 'SONIC' option is highlighted. A small window titled 'SONIC Reader' is open, displaying a search interface with 'Springer Keyword Search: Cysteine', 'Springer Web Search Home', and 'Search Saved Articles'. The main content area shows a search result for 'Cysteine Proteases of Pathogenic Organisms' by M. W. Robinson and J. P. Dalton, published in 2011. The result includes a thumbnail of the book cover, the authors' names, and a brief description: 'Cysteine proteases expressed by pathogenic organisms play key roles in virulence including host'. Below the search result is a URL: 'www.springer.com/gp/search?query=cysteine&submit=Submit'. The bottom of the interface has a navigation bar with icons for back, forward, and search.

Document Viewers Augmented With APIs

Publishing
1
Publishing
Slide
2
Publishing
3
Publishing
Slide
4

Another strategy for interactive publications is linking documents with APIs maintained by publishers, or by cultural or educational institutions.

View Instructions

As an example, documents mentioning artifacts held in a museum can provide features to view more information about those museum-pieces through the host institution's API.



↑

Row: 0 Column: 0

MEDAL

 Click the icon to save

This is a **Medal**. We acquired it in 1920. It is a part of the **Product Development** department.

Cite this object as

Medal; bronze; 1920-30

Embedded Multimedia

Publishing
1
Publishing Slide
2
Publishing Slide
3
Publishing
4

Custom-built A3R document viewers can provide convenient access to multimedia content embedded in or linked to texts — including audio files, videos, and 3D graphics scenes or models.

Ailurus fulgens styani (also known as *a. f. fulgens*): Only found in China (in the Hengduan

Mo
My
The
ab

In this case a video player is launched in a dialog box, floating above the article text. For those reading digital books or articles, videos and other multimedia content can be presented through secondary windows launched via context menus; text and multimedia may thereby be viewed side-by-side.

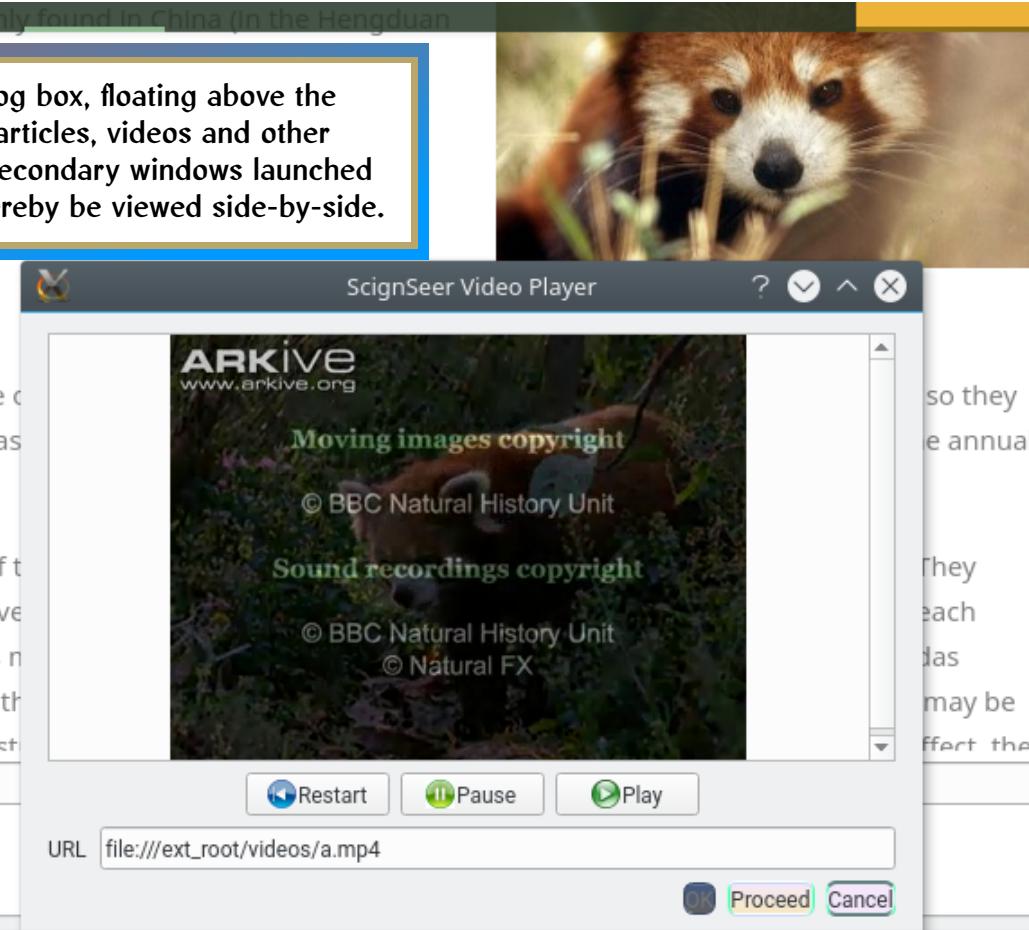
Behavior

Red pandas are generally solitary, but there are a couple of cases where they develop extended associations with their mothers that last through the breeding season.



ark.org/red_panda/about-the-red-panda/

In terms of their social behavior, red pandas tend to have a very limited interaction with other. This is particularly true during the breeding season, when they may be patchily distributed across their range.



Thank You!

Thanks

Please contact Linguistic Technology Systems for more information about NA3 and/or other Software Development and Software Language Engineering Solutions: (917) 817-2184.

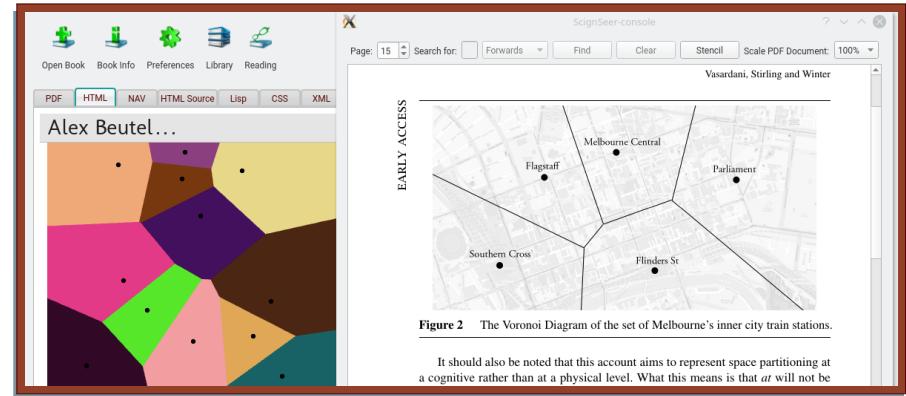
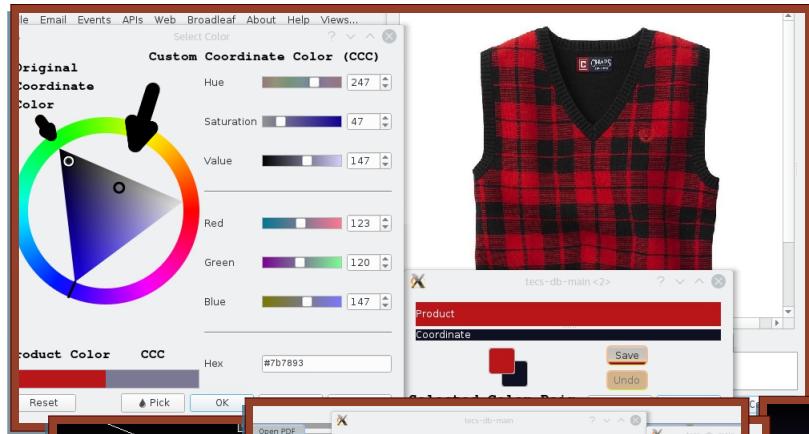


Figure 2 The Voronoi Diagram of the set of Melbourne's inner city train stations.

It should also be noted that this account aims to represent space partitioning at a cognitive rather than at a physical level. What this means is that *at* will not be

