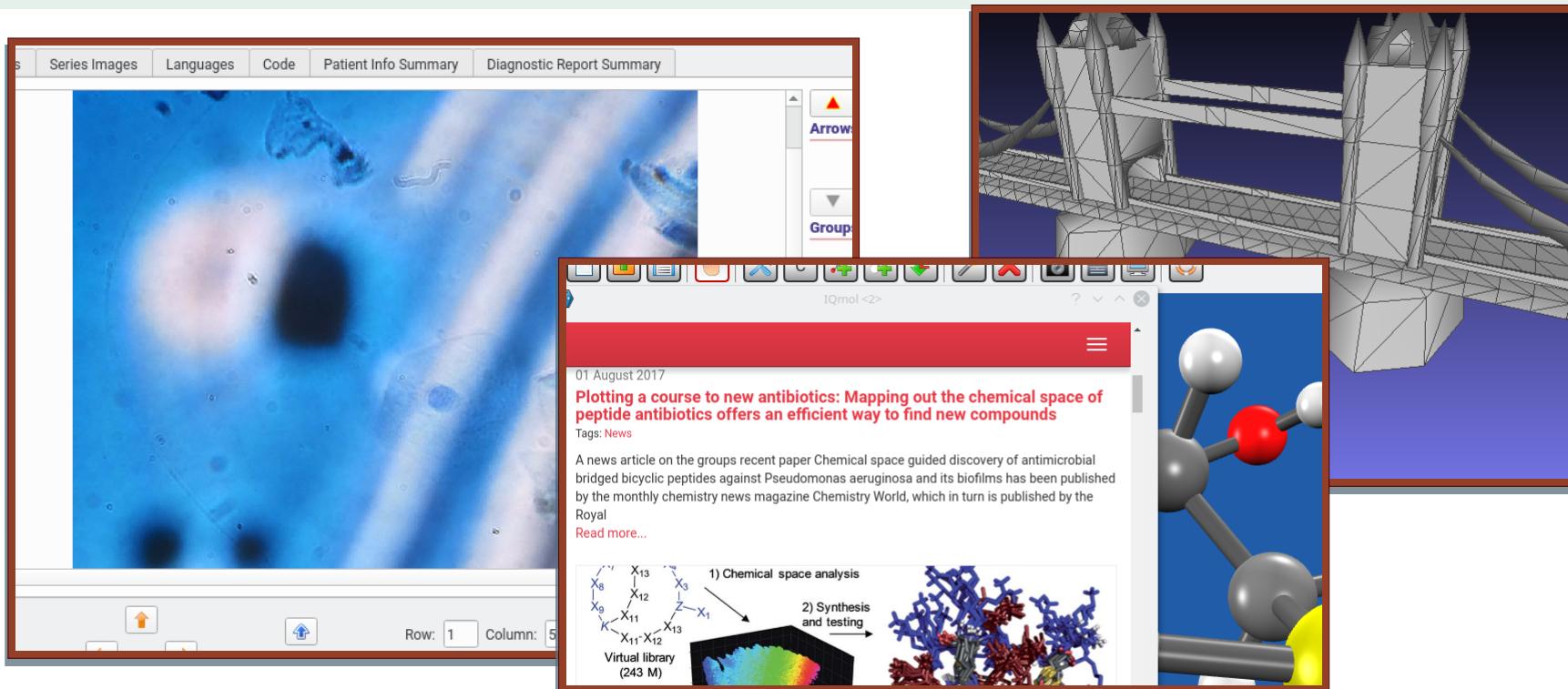


The NCN/A3R ("NA3")

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

- “Native Cloud/Native” refers to native application front-ends paired with Cloud/Native container instances.
- Share 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).
- This presentation will focus on NA3’s default Qt implementation, though the technology can be ported to other application frameworks (wxWidgets, XCode, MFC, etc.).

How Cloud Back-Ends Enhance Native Front Ends

- Cloud Backup; Share data between users; Collaborative Editing
- Persist users’ application state across different computers (home/school/office)
- Upgrade running applications without re-compile

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

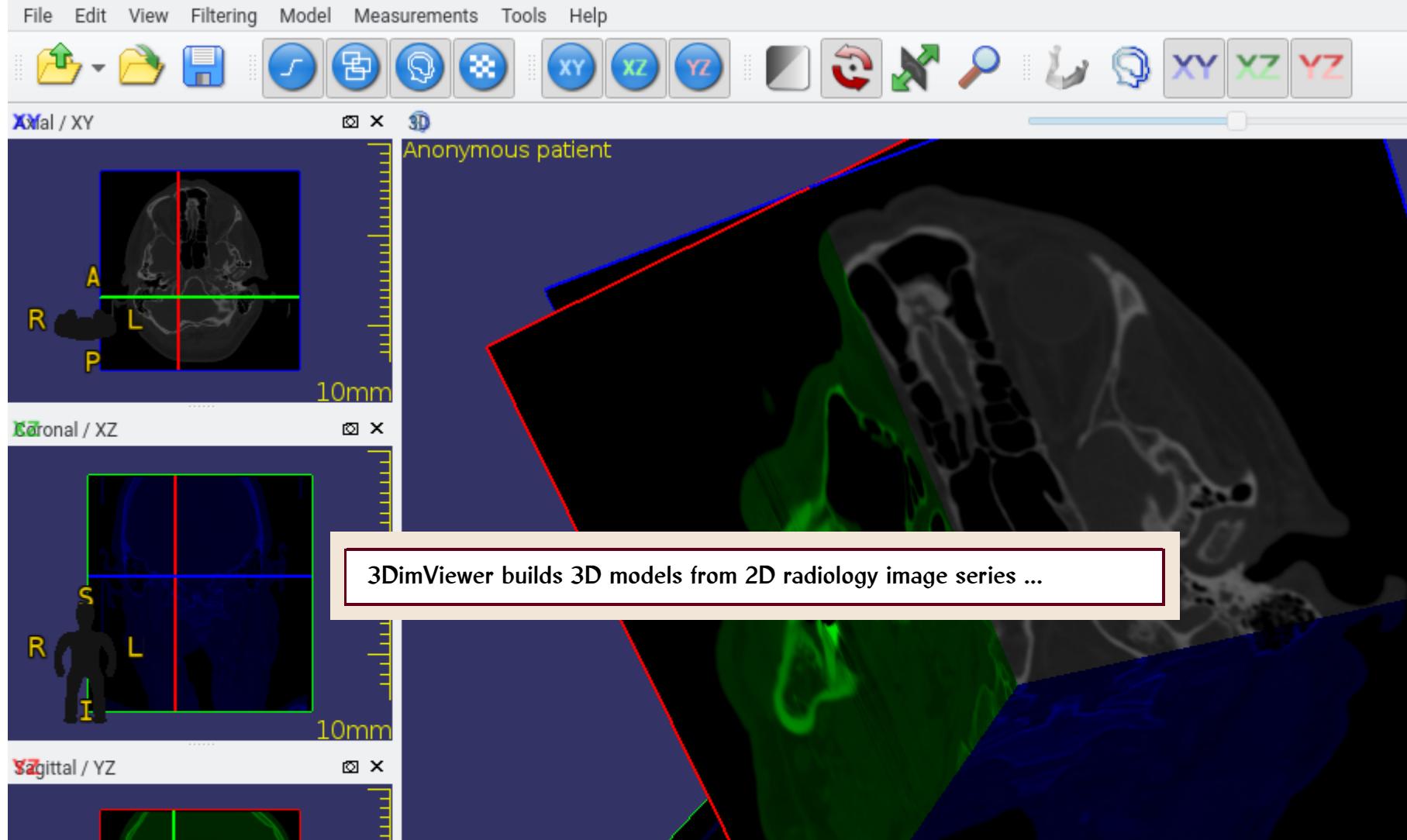
Native applications offer superior User Experience, leveraging distinct interactive features of desktop GUIs: context menus, dialog boxes, tool tips, Multiple Window Display, dock windows, and so on:

- 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

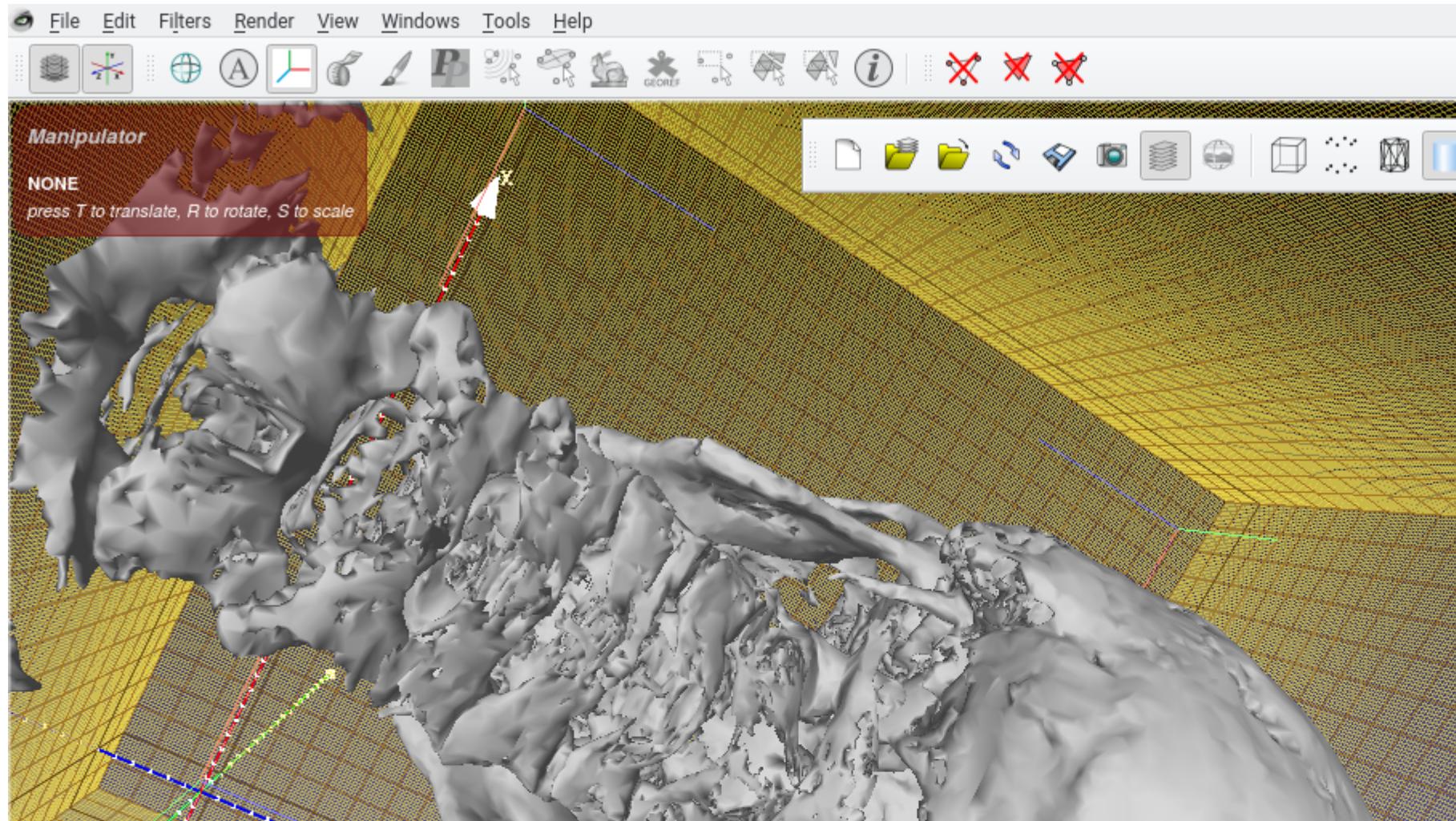
Research S
Research Slide 2
Research Slide 3
Research Slide 4
Research Slide 5

This slide and the next demonstrate a case-study where inter-application data sharing enhances two applications' capabilities — 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 components) 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

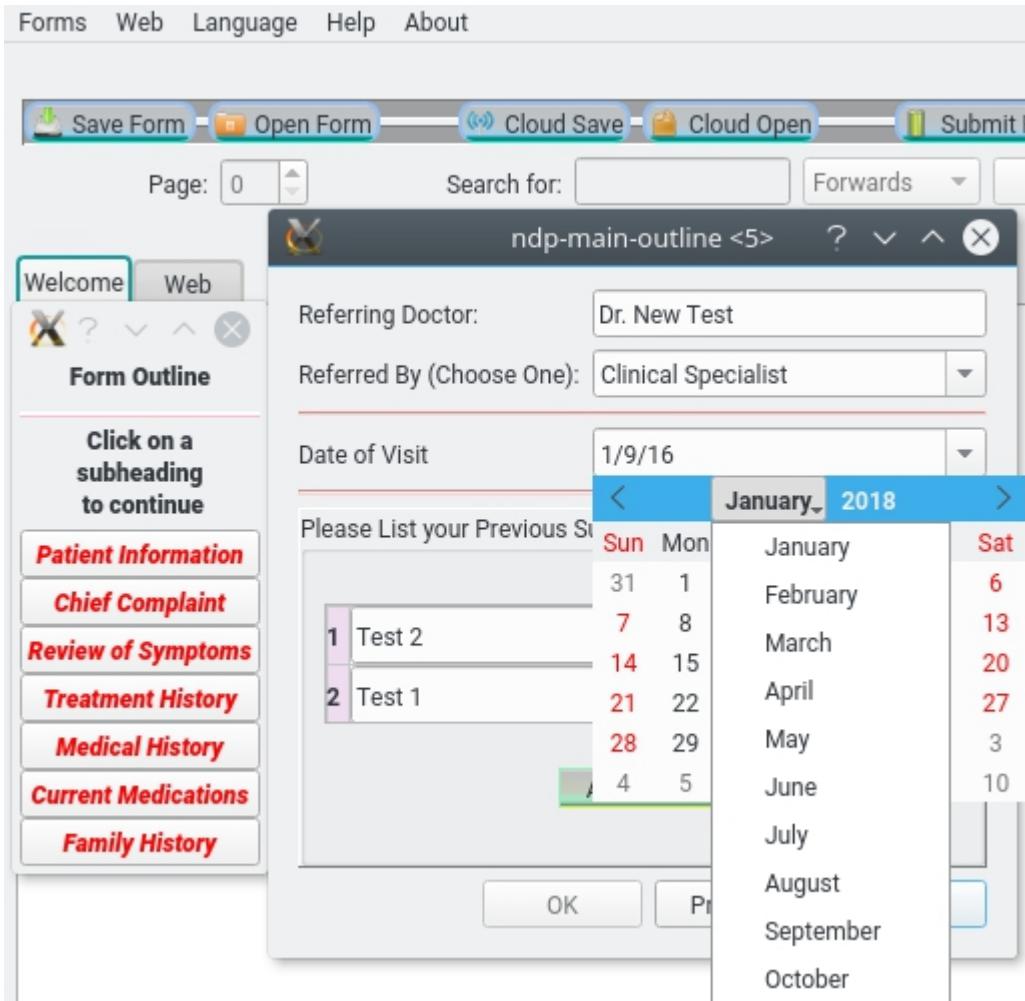
Referred By (Choose One): Clinical Specialist

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

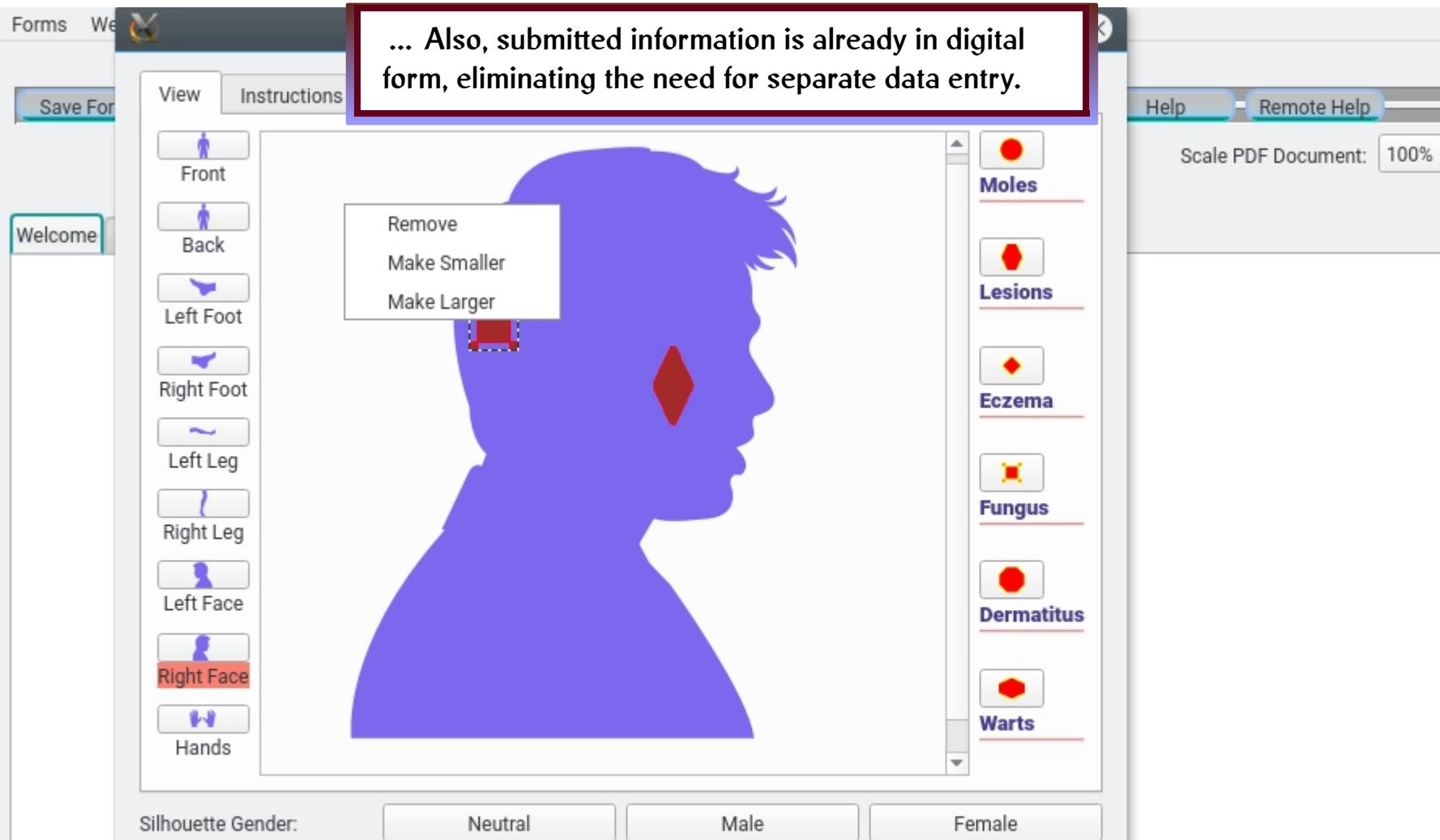


In medicine and social science, “data collection instruments” (DCIs) refer to surveys, questionnaires, and other tools to get human feedback.

Qt-Based Interactive Forms

Research Side 1
Research Side 2
Research Side 3
Research Side 4
Research Side 5

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.

View Instructions Series Images Languages Code Patient Info Summary Diagnostic Report Summary

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



Silhouette Zoom: < > Clear

Image Transforms ... Annotations Transforms ...

Pan Zoom Slide Pan Rotate Zoom

Arrows
Comments
Lists
Arcs
Rulers

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 to 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. 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.

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”

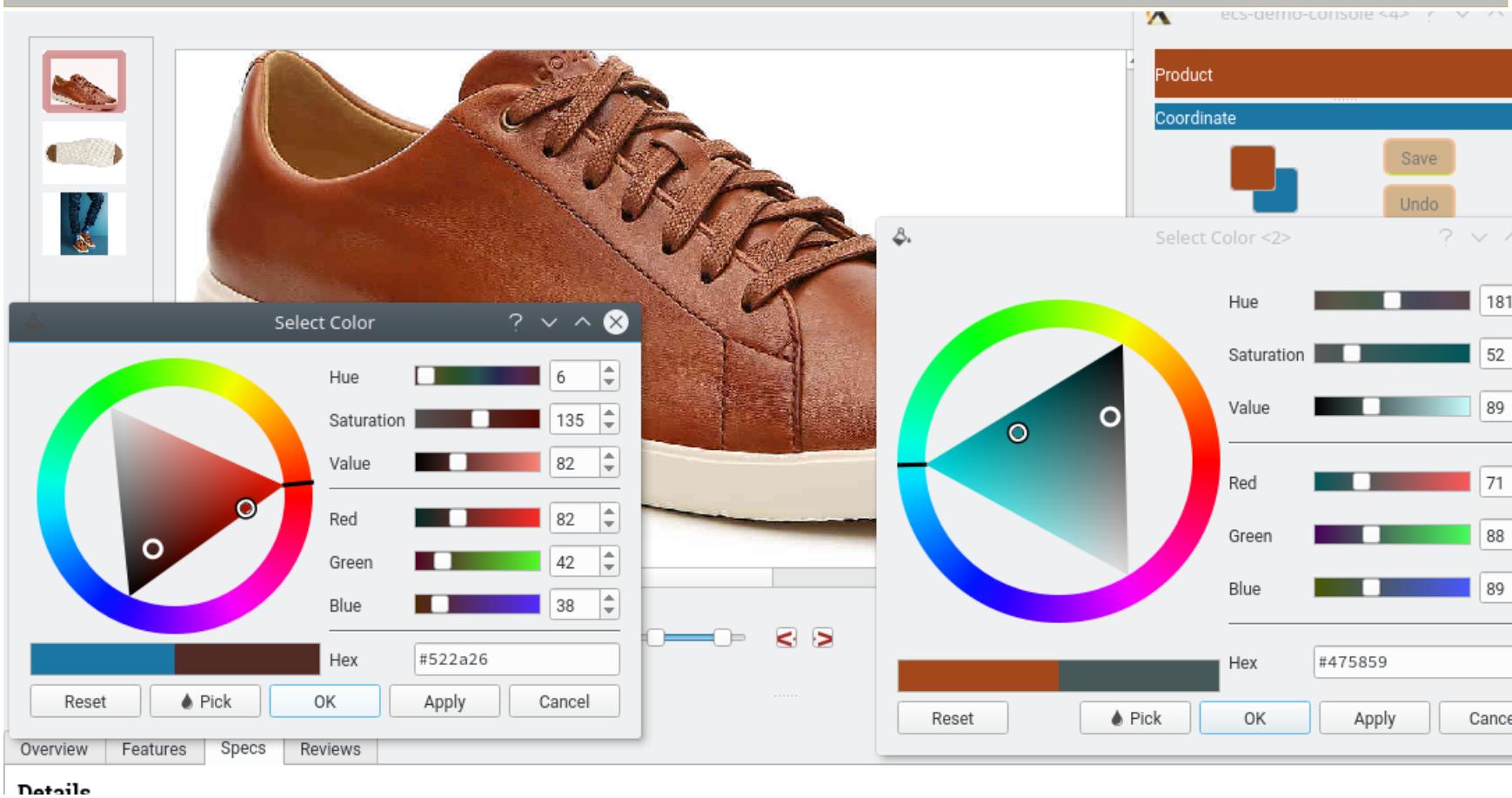
Instead of static lists, shopping carts can be multi-dimensional, multiple-window interactive displays.

The image shows a screenshot of a software application interface, likely a digital catalog or shopping cart, demonstrating a multi-dimensional, multi-window interactive display. The interface is divided into several sections:

- Top Bar:** A horizontal menu bar with options: File, Email, Events, APIs, Web, Broadleaf. Below the menu is a toolbar with a "Page: 0" dropdown, a "Search for:" input field, and a "Zoom: 100%" dropdown.
- Product Grid:** A grid of thumbnail images representing different floral arrangements.
- Product Window 1 (Left):** A window titled "tecs-db-main <2>". It displays a large image of a bouquet of purple peonies and greenery. To the left of the image is a description box: "Lily Garden Silk Peony Bouquet Home Decoration, Lilac, 18 Inches High". Below the image are buttons for "Overview", "Specs", "Reviews", and "Q & A". At the bottom are "OK" and "Cancel" buttons.
- Product Window 2 (Right):** A window titled "tecs-db-main <3>". It displays a large image of a bouquet of large, dark purple hydrangea flowers. To the right of the image is a description box: "Frosted Hydrangea, Mauve, 32 Inches High, 12 Floral Sprays". Below the image are buttons for "Overview", "Specs", "Reviews", and "Q & A". At the bottom are "OK" and "Cancel" buttons.

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 may be displayed via interactive, multidimensionally-organized, color-coded photo viewers.

The screenshot shows a software application window titled "rpdf-emb-console". On the left, there is a grid of thumbnail images representing different rooms of a house. A specific thumbnail in the middle row is highlighted with a red border and has an arrow pointing to it from a callout box. This callout box contains the text "Color-Coded Groups" and lists eight room categories, each associated with a colored bar: 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). To the right of the grid is a large image of a bedroom with a wooden bed, a chaise lounge, and a dresser. A callout box over this image contains the text "Current Photo". At the bottom of the interface, there are navigation buttons (left and right arrows), an "Item: 19" label, an "Image Zoom" slider, and "OK" and "Cancel" buttons.

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 been viewed; and the thumbnail of the current viewed photo marked with a thick colored border (surrounding the thumbnail and any overlays).

The screenshot shows a photo viewer interface with a grid of 40 thumbnails. A large image of a living room is displayed on the right. Three text annotations with arrows point to specific features:

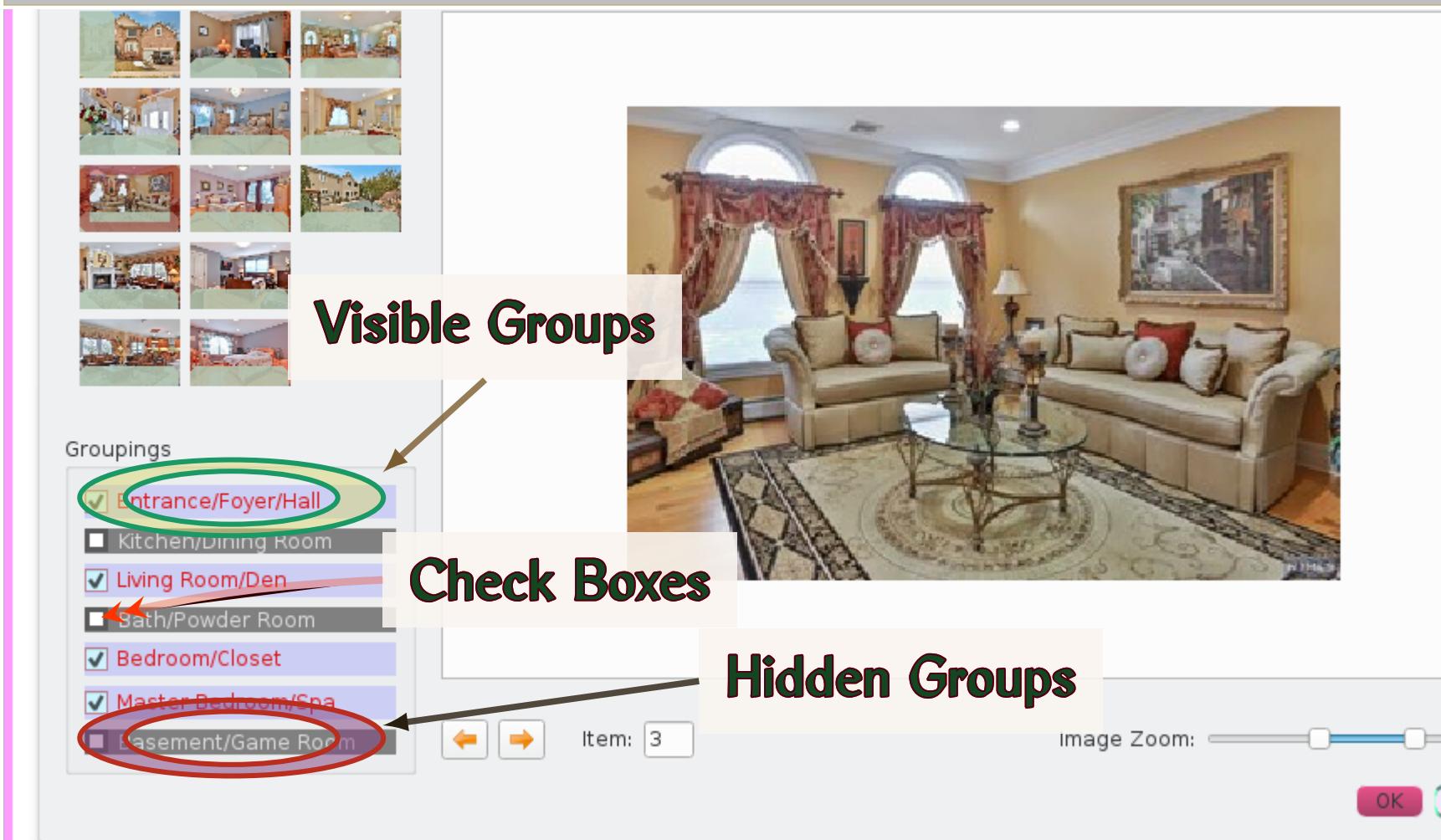
- Already Viewed (vertical color band)**: Points to a thumbnail in the second row, third column, which has a vertical purple border.
- Not Yet Viewed (horizontal color band)**: Points to a thumbnail in the fourth row, fifth column, which has a horizontal purple border.
- Current Photo (viewed for the second time)**: Points to a thumbnail in the second row, second column, which has a thick purple border and is highlighted.

The interface includes a toolbar, an outline panel, and a groupings list:

- Groupings list:
 - Entrance/Foyer/Hall (teal)
 - Kitchen/Dining Room (yellow-green)
 - Living Room/Den (purple)
 - Bath/Powder Room (blue)
 - Bedroom/Closet (light blue)
 - Master Bedroom/Spa (light green)
 - Basement/Game Room (grey)
- Navigation: back, forward, item 10, image zoom.

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 application. On the left, there is a grid of thumbnail images representing different rooms. In the center, a large arrow points from the text "Visible Groups" to a list of checkboxes labeled "Groupings". The "Entrance/Foyer/Hall" checkbox is checked and highlighted with a green oval. The "Living Room/Den" checkbox is also checked and highlighted with a pink oval. The "Sath/Powder Room" checkbox is unchecked and highlighted with a red oval. The "Bedroom/Closet" and "Master Bedroom/Spa" checkboxes are checked and highlighted with purple ovals. The "Basement/Game Room" checkbox is unchecked and highlighted with a red oval. On the right, a large arrow points from the text "Check Boxes" to a large image of a living room with a sofa, a coffee table, and a painting on the wall. At the bottom, there are navigation buttons (left and right arrows), an "Item: 3" label, an "Image Zoom" slider, and "OK" and "Cancel" buttons.

Visible Groups

Check Boxes

Hidden Groups

Groupings

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

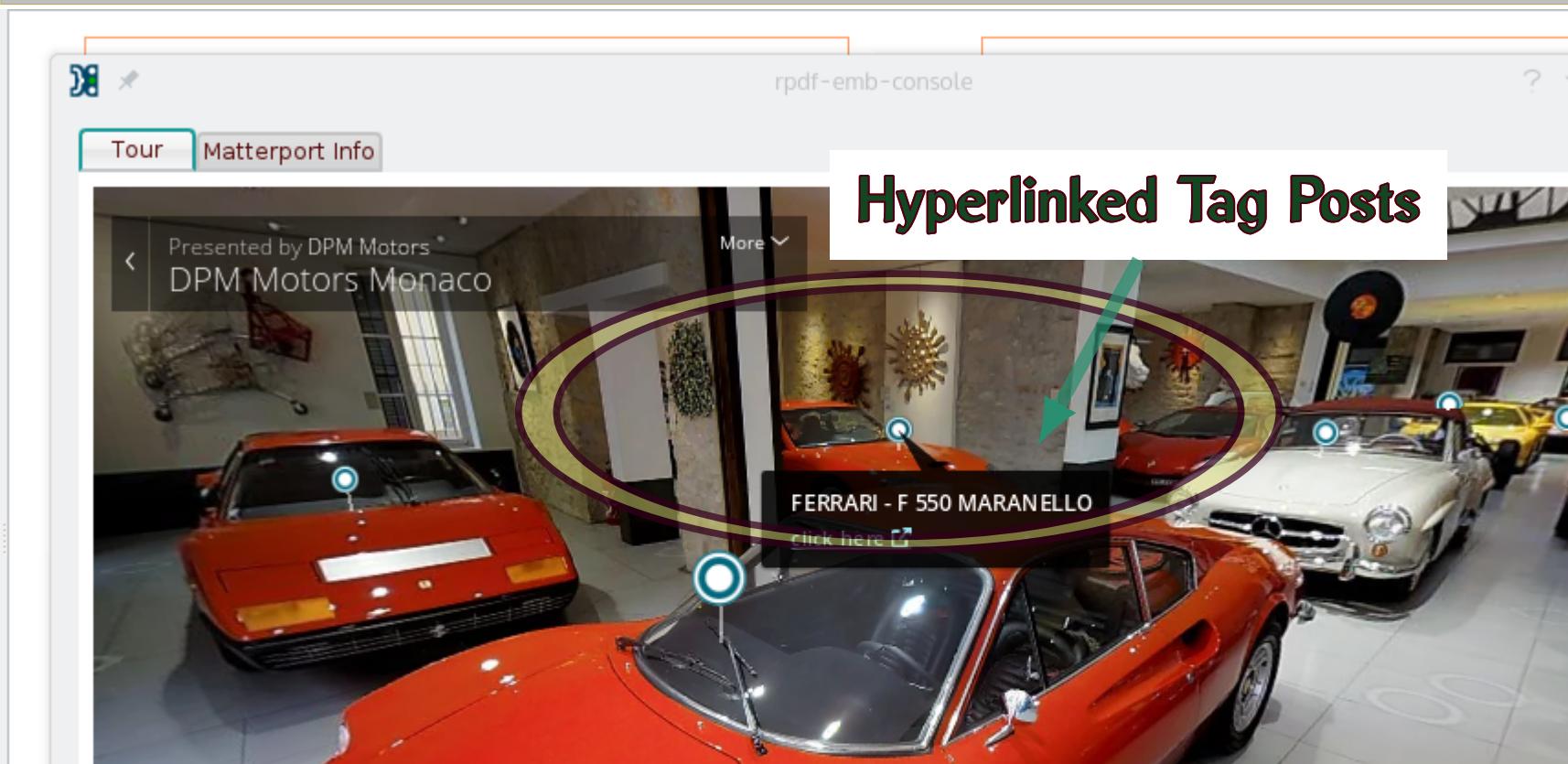
Item: 3

Image Zoom:

OK Cancel

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 Materport, 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 Slide
2
Publishing Slide
3
Publishing Slide
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 — here, a widget allowing readers to visually explore patterns in classical Indian music.

The screenshot shows a digital journal interface. At the top, there are three icons: a gear (Preferences), a book (Library), and a book with glasses (Reading). Below these are tabs for 'HTML Source', 'Lisp', 'CSS', and 'XML'. The main content area is a red box labeled 'Read article view'. At the bottom, there is a navigation bar with a left arrow, a central search bar, and a right arrow.

The screenshot shows a 'Tala' pattern viewer. At the top, a dropdown menu says 'Display Tala Types: Jhoomra/Dhamar (14 beats)'. Below it is a large rectangular grid divided into 14 columns. The top row is red, and the bottom row is green. Between them are several purple lines of varying lengths. Below this grid is a horizontal slider with 'Pattern 1 (3-4-3-4)' on the left and 'Pattern 2' on the right. At the bottom, there is a 'File' input field containing the path '/extension/ScignSeer/articles/svg/tala.svg' and a 'Proceed' button.

ANTHROPOLOGY AND HUMANISM

[Explore this journal >](#)

Ethnographer as Apprentice: Embodying omusical Knowledge in South India

da Weidman

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

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 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 Design** department.

Cite this object as

Medal; bronze; 1920-3

◀ ▶

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 documents — 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 Mountains in Sichuan and the East Nujiang River of Yunnan Province) and northern Myanmar.

The head and body length of red pandas averages 56 to 63 cm (22 to 25 in), and their tails about 37 to 47 cm (15 to 19 in).



Behavior

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



In terms of territoriality, red pandas tend to have overlapping ranges with other. This means that they search for the best food sources and patchily distributed habitats.

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

so they
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each
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may be
ffect the

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Sound recordings copyright
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© Natural FX

Restart | Pause | Play

URL: file:///ext_root/videos/a.mp4

OK | Proceed | Cancel

Thank You!

Thanks

Please contact Linguistic Technology Systems for more information about NA3 or other Software Development and Software Language Engineering solutions.

