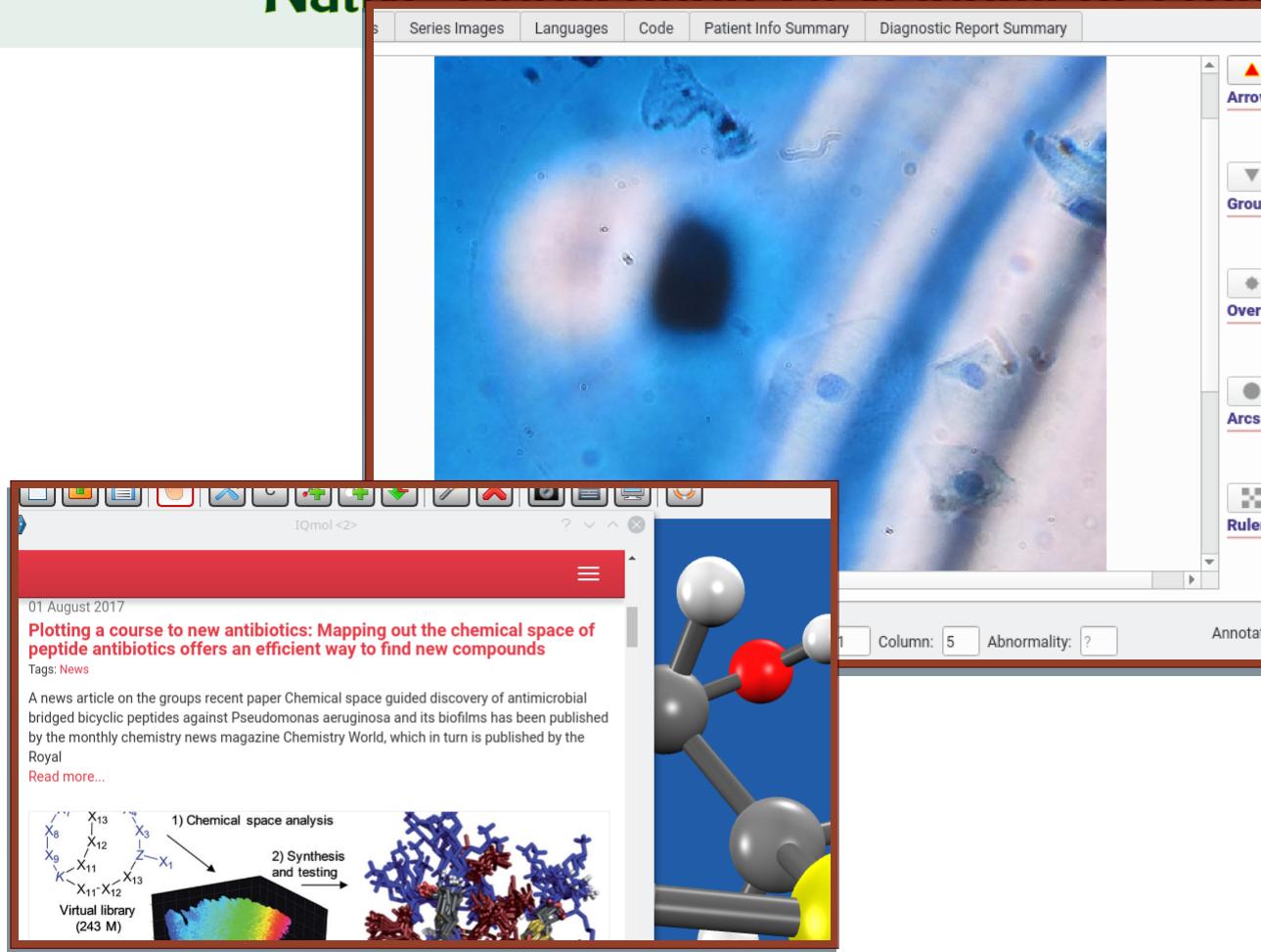


The NCN/A3R ("NA3")

Native Application Development Framework



Linguistic Technology Systems
POC: Amy Neustein, Ph.D.
Founder and CEO
amy.neustein@verizon.net

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

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).

The Qt Ecosystem

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

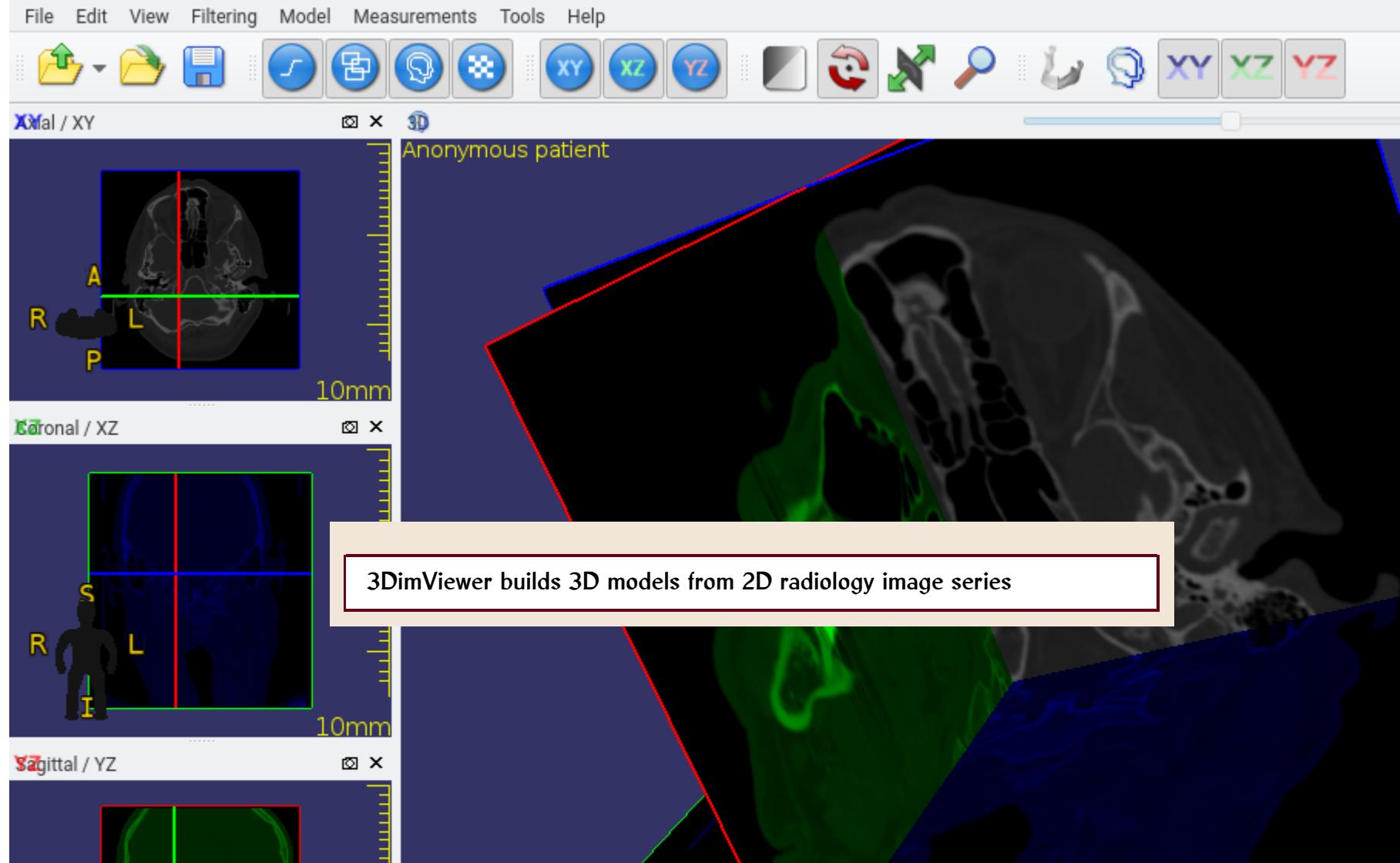
- Export data and instructions between Qt-based applications (slides e-e).
- Embed document or multi-media viewers inside scientific or dataset applications (slides e-e).

Responsive, desktop-style applications for enhanced UX

- Compelling front-ends for e-commerce, Real Estate, VR, etc. (slides e-e).
- Native applications offer superior User Experience, leveraging distinct interactive features of desktop GUIs: context menus, dialog boxes, tool tips, Multiple Window Display, dock windows, etc.
- For scientists and researchers, build innovative data-collection instruments as well as interactive Research Object applications (slides e-e).

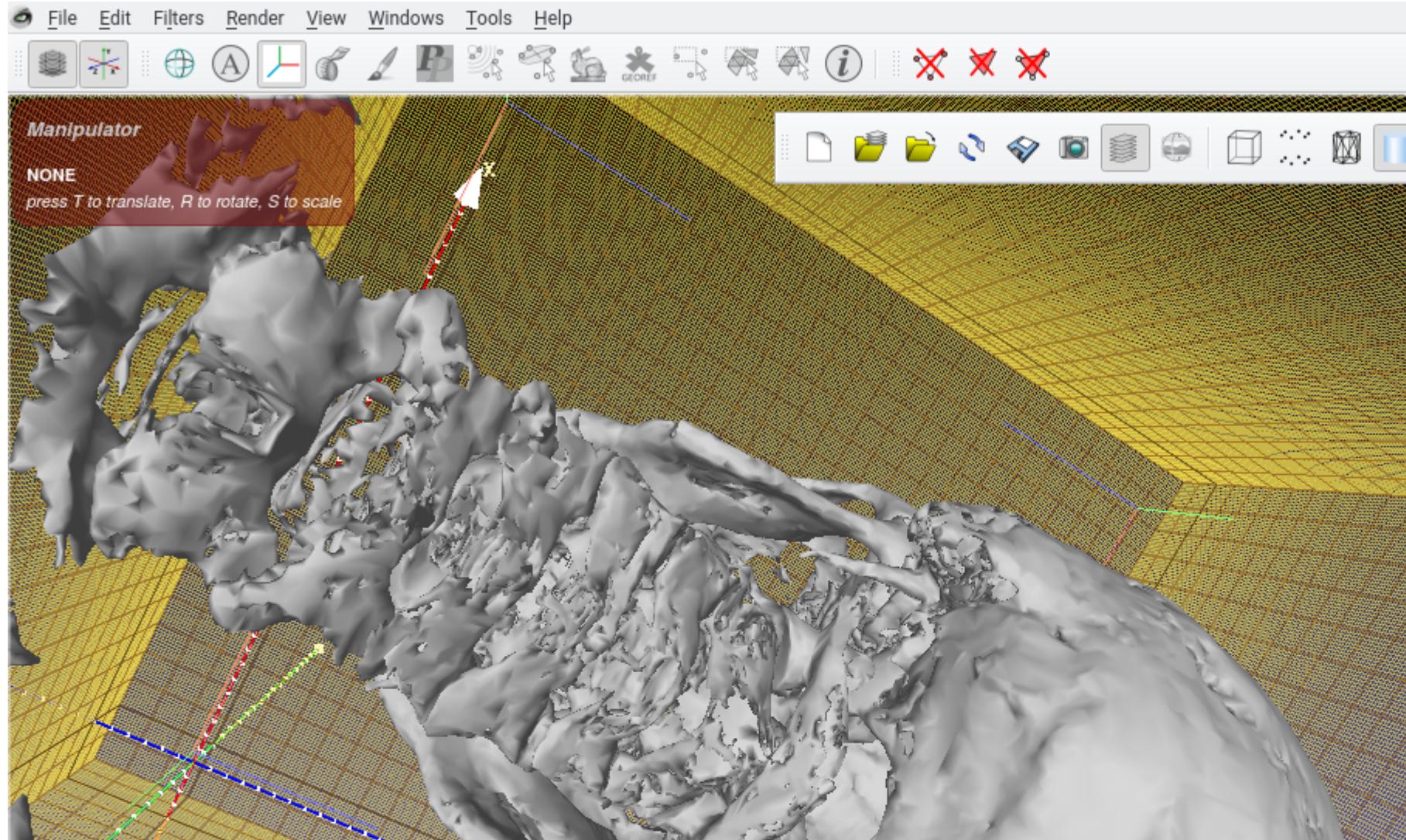
An Example of Inter-Application Networking

This slide and the next demonstrates a case-study where inter-application data sharing enhances applications' capabilities.



3D Graphics Sent to MeshLab

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



A3R Applications as Data Collection Instruments

Forms Web Language Help About

Save Form Open Form Cloud Save Cloud Open Submit Form

Page: 0 Search for: Forwards

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

ndp-main-outline <5> ? ^ X

Referring Doctor: Dr. New Test

Referred By (Choose One): Clinical Specialist

Date of Visit 1/9/16 < January 2018 >

Please List your Previous Stays

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

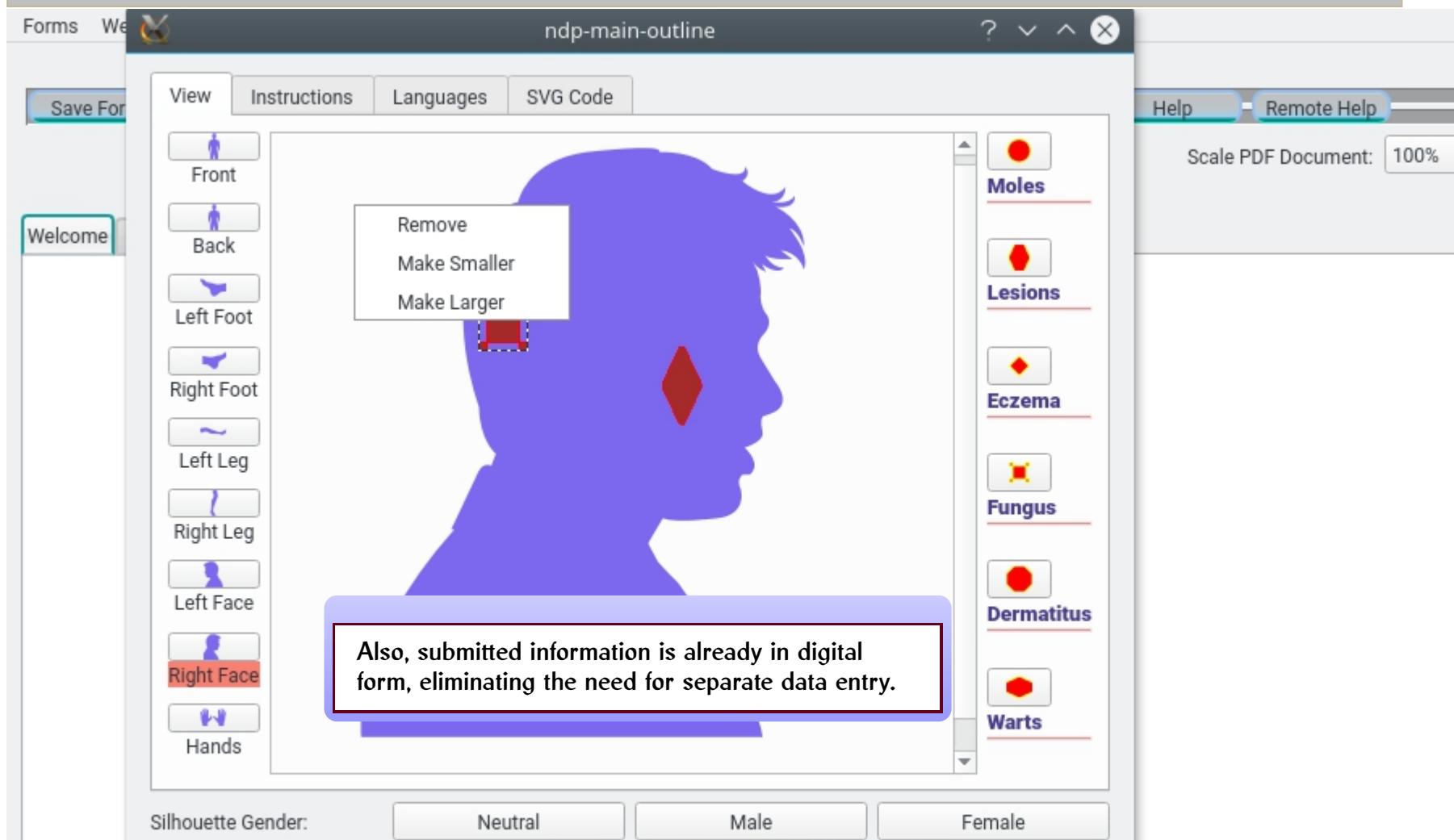
OK Print

January February March April May June July August September October

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

Qt-Based Interactive Forms

DCIs 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 the benefits of native applications for “obtaining” data, A3R components are also powerful tools for showing and analyzing research findings.

A3R applications can be implemented as “Research Object Bundles” — combinations of code and data providing access to data sets without the need for external software.

The interface shows a central image of a cell with a red arrow pointing to its nucleus. To the left is a vertical stack of small thumbnail images. To the right are toolbars for Arrows, Comments, Lists, Arcs, and Rulers. At the bottom are controls for Silhouette Zoom, Image Transforms, Annotations Transforms, and various movement and rotation buttons.

Silhouette Zoom:

Image Transforms ...

Annotations Transforms ...

Pan Zoom Slide

Pan Rotate Zoom

Native Applications as Interactive Catalogs

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's a sidebar with three small thumbnail images of shoes. The main area features a large, detailed image of a brown leather sneaker with white laces and a white sole. A context menu is open over the image, listing options like 'Detach Image', 'Detach Noteboook', 'Detach Description', 'Detach Everything' (which is highlighted in blue), 'Merge Windows', 'Explore Color Matches ...', 'View 3D Model ...', 'Take Screenshot', 'View Item List', and 'View Shopping Cart'. At the bottom of the main window, there are navigation icons for up, down, left, right, and zoom, along with a text input 'Item: 3' and an 'Image Zoom:' slider. Below the main image, there are tabs for 'Overview', 'Features', 'Specs', and 'Reviews'. Under the 'Overview' tab, there's a bulleted list: '• Leather upper', '• Lace-up', and '• Round toe'. To the right of the main image, there's a section titled 'Grand Crosscourt II Sneaker' with a description: '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!'. Below this, there's a heading 'Actions:' followed by two blue links: 'Add to Cart' and 'Explore Colors'. There are also two small circular color swatches at the bottom right.

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

Item: 3 Image Zoom:

Overview Features Specs Reviews

- Leather upper
- Lace-up
- Round toe

Grand Crosscourt II Sneaker

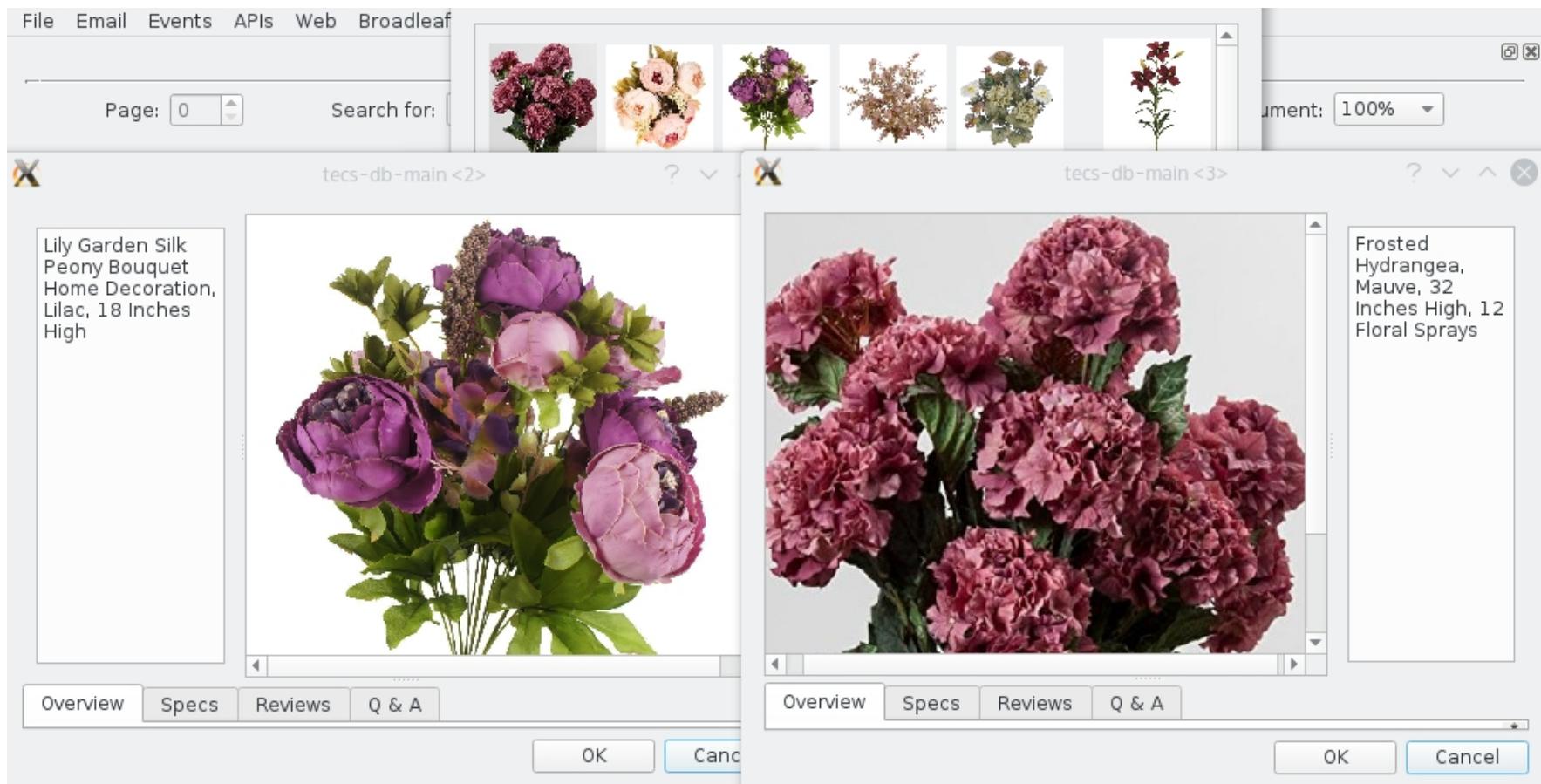
Sleek and simple, the Grand Crosscourt II sneaker from Cole Haan is the perfect way to add some tailored casual style to your every day look!

Actions:

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

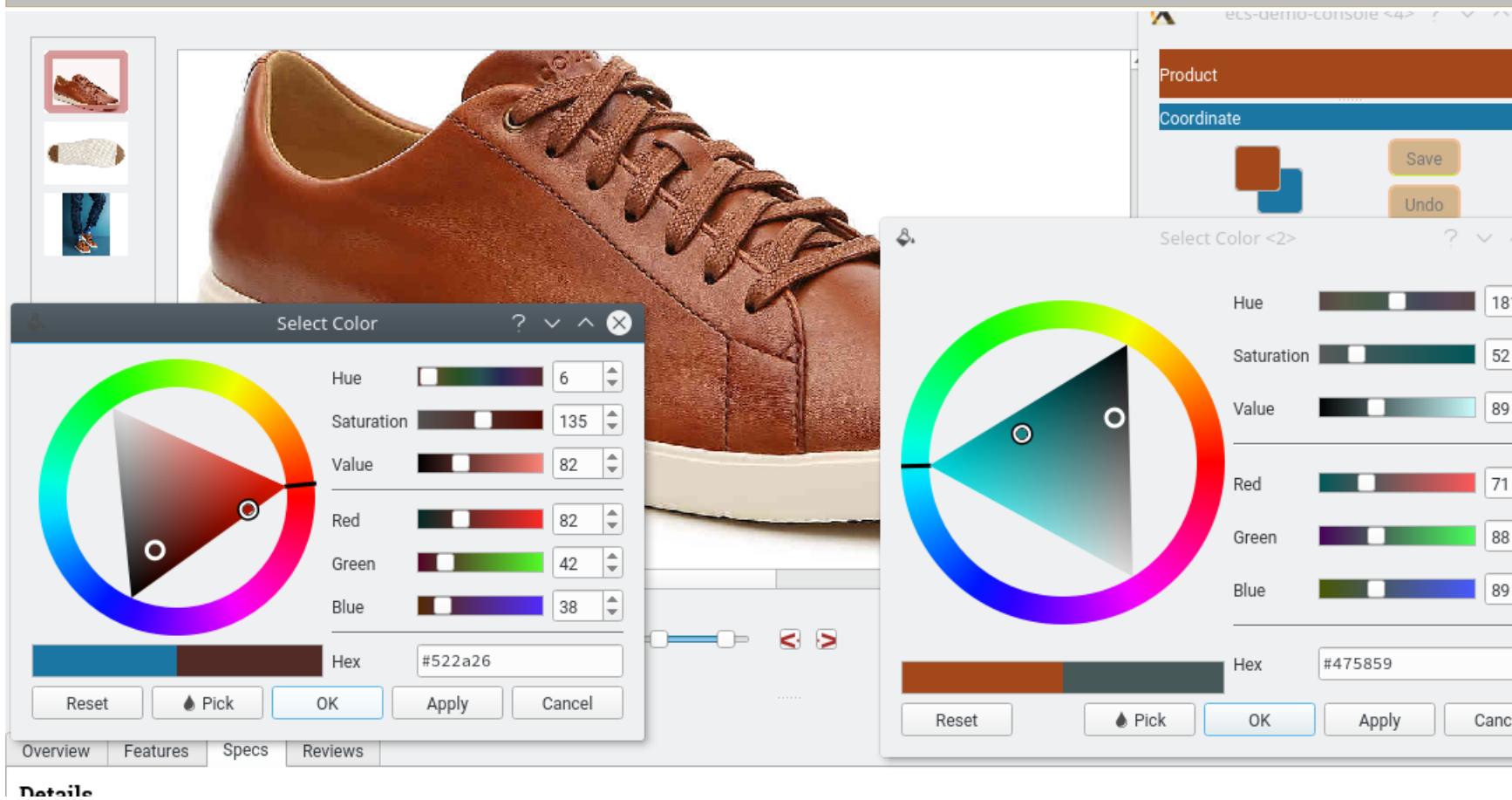
Interactive “Shopping Carts”

Instead of static lists, shopping carts in a native context can be multi-scale, multi-window interactive displays.



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

Native applications can also bring enhanced UX to Real Estate presentations — instead of just groups of photos, properties may be introduced via interactive, color-coded photo viewers visually organized according to desktop-software conventions.

The screenshot shows a software interface titled "rpdf-emb-console". On the left, there is a grid of thumbnail images representing different rooms of a house. On the right, a larger image of a master bedroom is displayed. A callout box labeled "Current Photo" points to the large image. Below the large image, there are navigation arrows, an item counter (Item: 19), and zoom controls. To the left of the main content area, a sidebar titled "Groupings" lists categories for the photos, each associated with a colored bar: Entrance/Foyer/Hall (teal), Kitchen/Dining Room (yellow-green), Living Room/Den (purple), Bath/Powder Room (blue), Bedroom/Closet (dark blue), Master Bedroom/Spa (light green), and Basement/Game Room (grey).

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

Item: 19

Image Zoom:

OK Cancel

Photo Viewer Interactive Cues

These slides demonstrate visual cues to aid photo navigation, such as color bands 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 (this border will surround the thumbnail and both horizontal and vertical overlays).

The screenshot shows a photo viewer interface with the following features:

- Already Viewed (vertical color band):** A green vertical bar is overlaid on the top thumbnail of the second row.
- Not Yet Viewed (horizontal color band):** A yellow horizontal bar is overlaid on the bottom thumbnail of the second row.
- Current Photo (viewed for the second time):** The bottom thumbnail of the second row is highlighted with a thick red border.
- Groupings:** A sidebar on the left lists room categories with corresponding colored bars:
 - Entrance/Foyer/Hall (teal)
 - Kitchen/Dining Room (yellow)
 - Living Room/Den (purple)
 - Bath/Powder Room (dark blue)
 - Bedroom/Closet (light blue)
 - Master Bedroom/Spa (light green)
 - Basement/Game Room (grey)
- Navigation:** Includes back and forward arrows, an item counter (Item: 10), and an image zoom slider.

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.

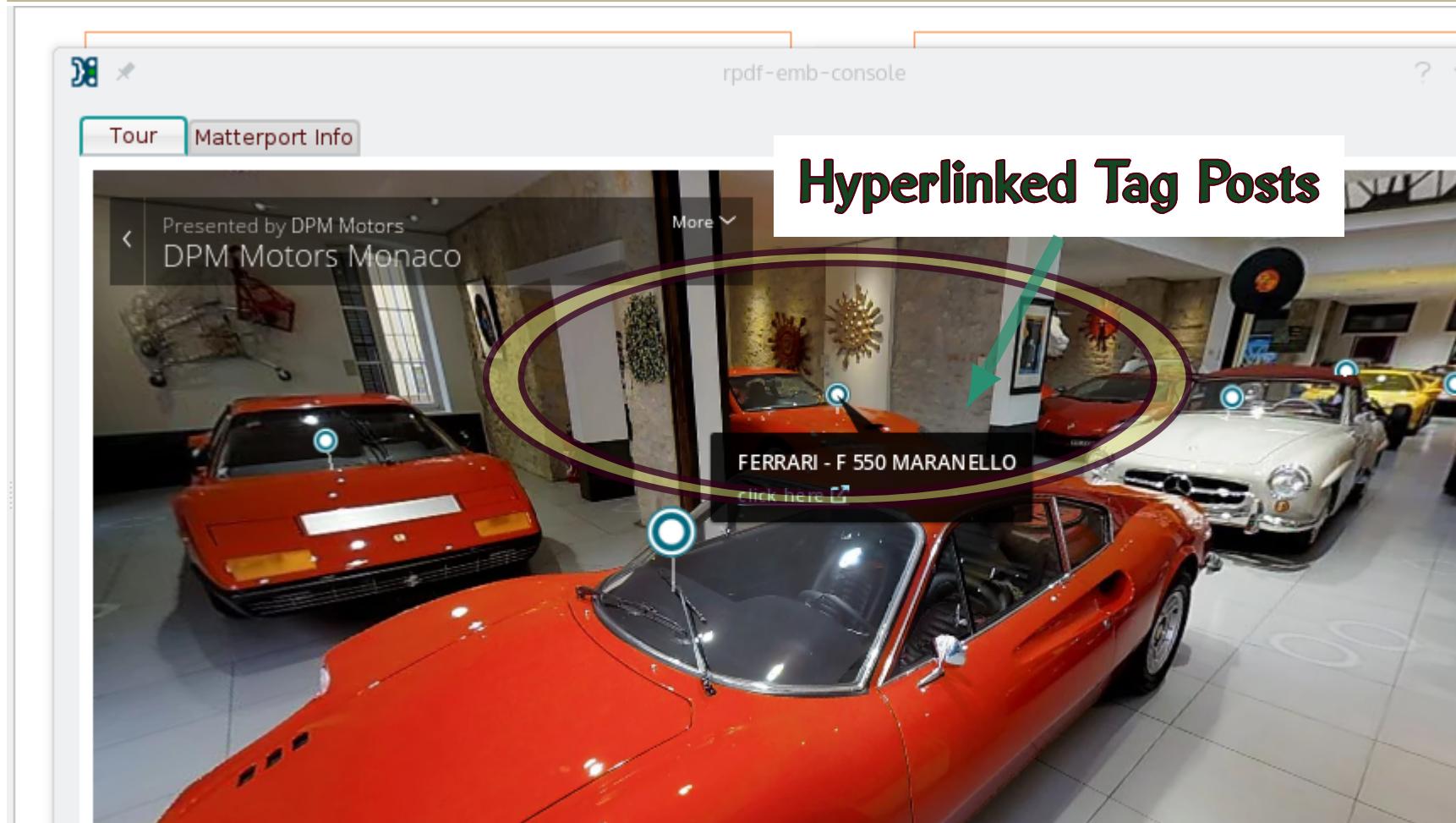
The screenshot shows a photo viewer application with a sidebar of thumbnail images and a main viewing area. On the left, under 'Groupings', there is a list of room categories with checkboxes:

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

A green oval highlights the first item ('Entrance/Foyer/Hall'), and a red oval highlights the last item ('Basement/Game Room'). Arrows point from these highlighted items to labels: 'Visible Groups' pointing to the green-highlighted item, and 'Hidden Groups' pointing to the red-highlighted item. The main viewing area displays a large image of a living room with two large arched windows and a sofa. At the bottom, there are navigation buttons (left/right arrows), an 'Item: 3' counter, an 'Image Zoom' slider, and 'OK' and 'Cancel' buttons.

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 feasibly realized with VR embedded in native software.



A3R Document Viewers

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.

Preferences Library Reading

HTML Source Lisp CSS XML

Red rectangular placeholder area

Display Tala Types: Jhoomra/Dhamar (14 beats)

Separate

Patterns

Pattern 1 (3-4-3-4) ————— Pattern 2 (

File /extension/ScignSeer/articles/svg/tala.svg

Proceed

ANTHROPOLOGY AND HUMANISM

[Explore this journal >](#)

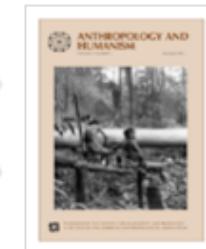
Ethnographer as Apprentice: Embodying Musical Knowledge in South India

da Weidman

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

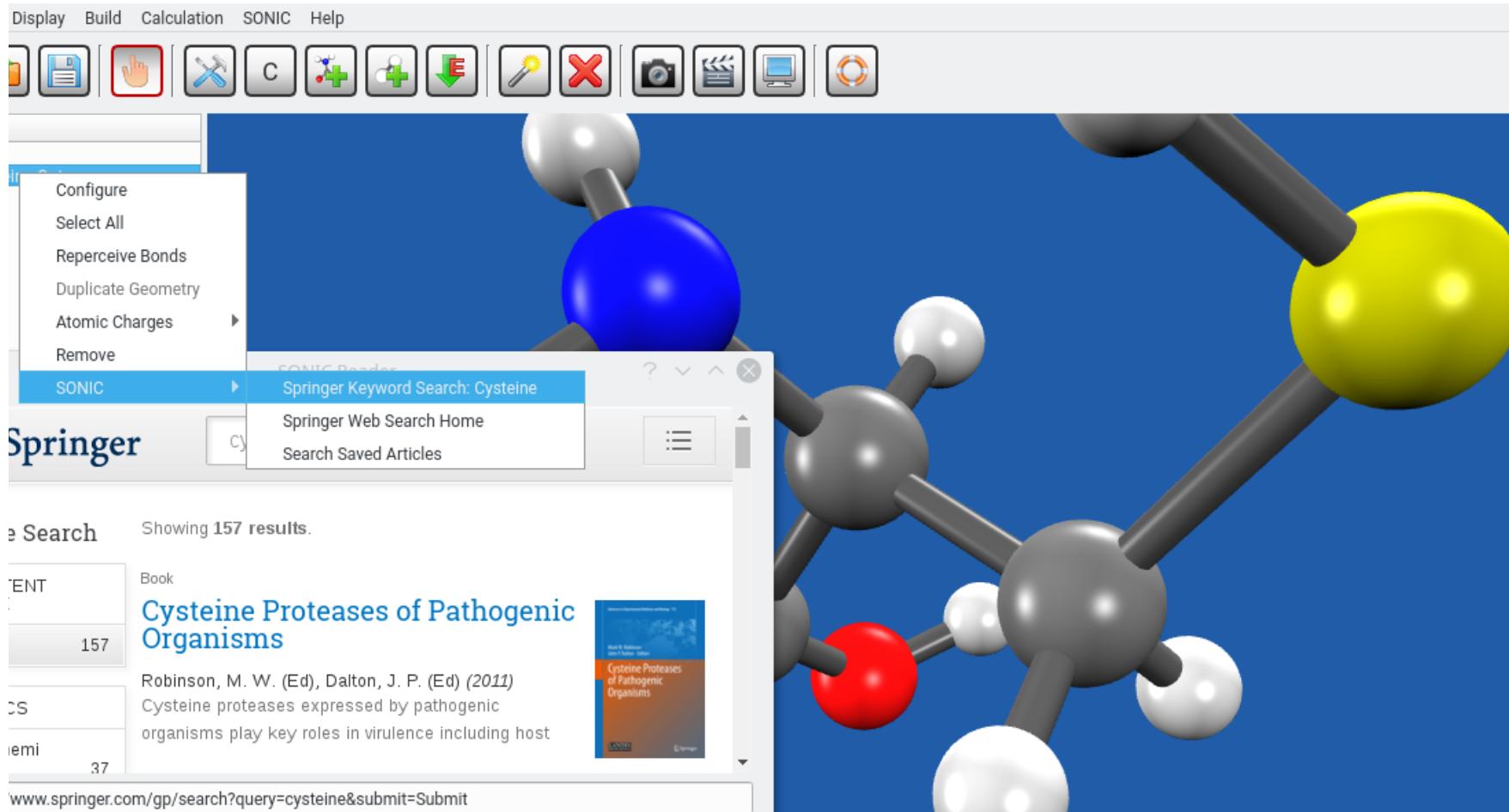
0.1111/j.1548-1409.2012.01131.x [View/save citation](#)

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 molecular visualization program) via an A3R document-viewer plugin.



Document Viewers Augmented With APIs

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.

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

Row: 0 Column: 0

February 2, 2020

Embedded Multimedia

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 syriani (also known as *a. f. refulgens*). 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 cases where 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 may be due to their search for the best food sources, which are patchily distributed across their habitat.

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

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ScignSeer Video Player

Restart | Pause | Play

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

OK Proceed Cancel

Thanks!

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

