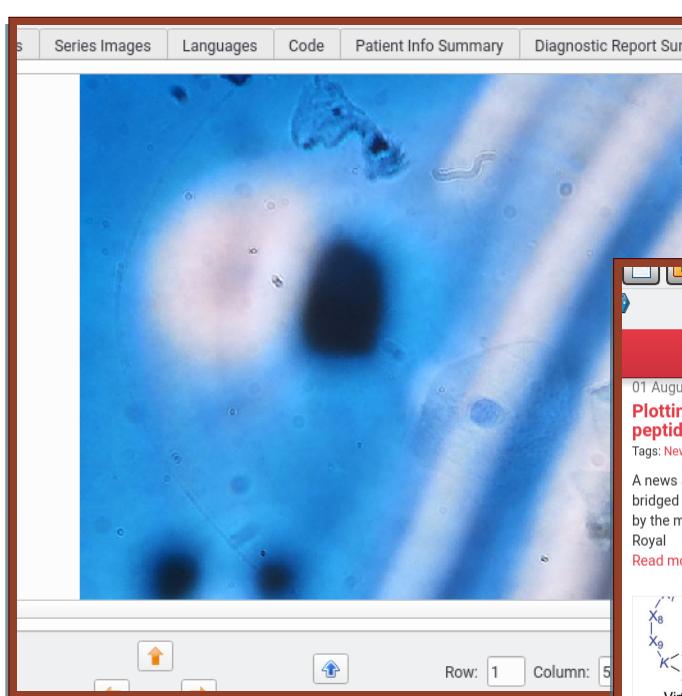


The NCN/A3R ("NA3")

Native Application Development Framework



A screenshot of a software interface. On the left, there is a 3D molecular model of a complex organic molecule. On the right, a news article from Chemistry World is displayed. The article title is "Plotting a course to new antibiotics: Mapping out the chemical space of peptide antibiotics offers an efficient way to find new compounds". It discusses the use of chemical space analysis and synthesis to discover new antibiotics. A small inset diagram shows a 3D plot of chemical space with axes labeled X1, X2, X3, X4, X5, X6, X7, X8, X9, X10, X11, X12, X13, and Z. The plot is labeled "Virtual library (243 M)".

Linguistic Technology Systems
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201-224-5096

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 6-7).
- Embed document or multi-media viewers inside scientific or dataset applications (slides 18-21).

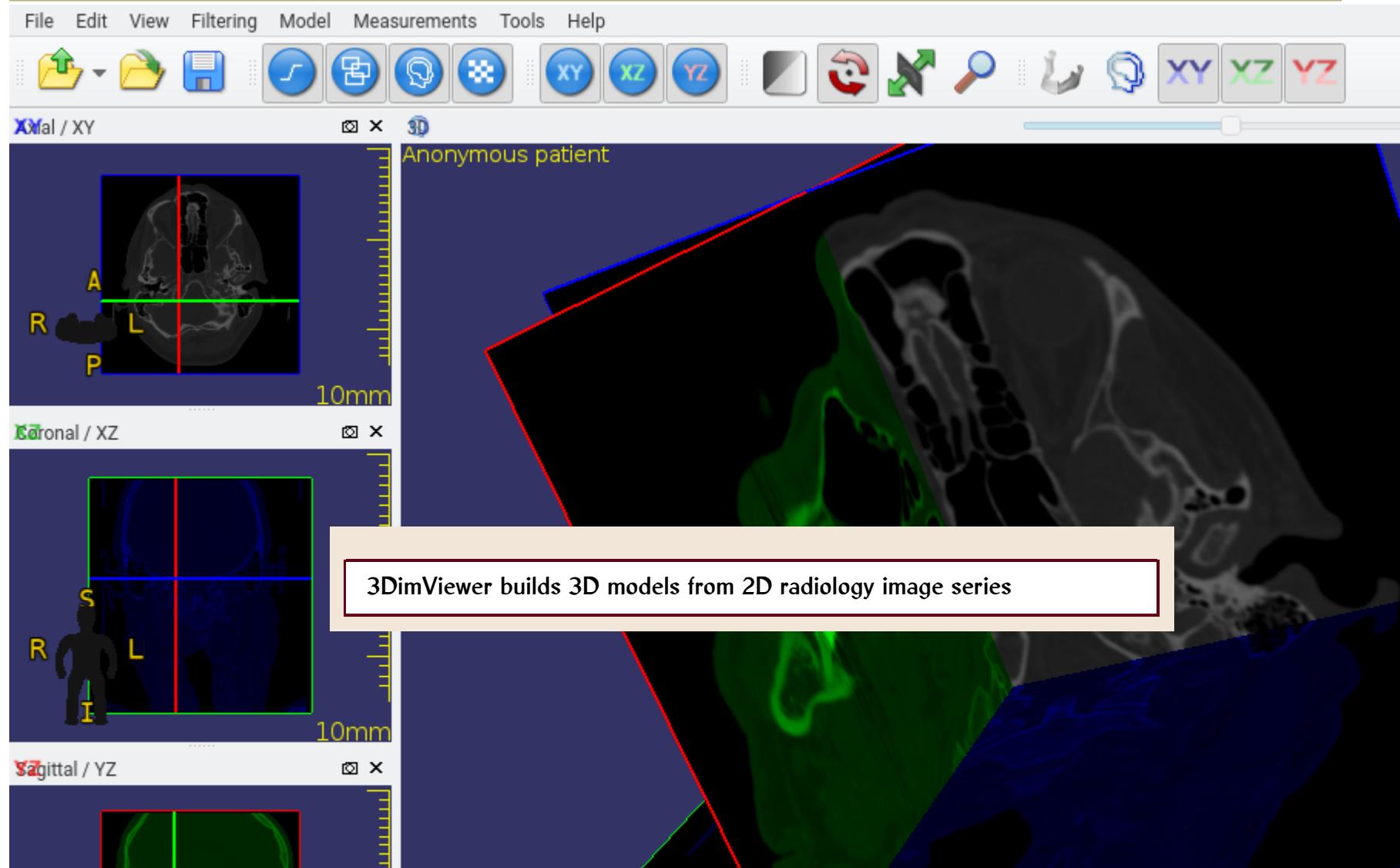
Responsive, desktop-style applications for enhanced UX

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).

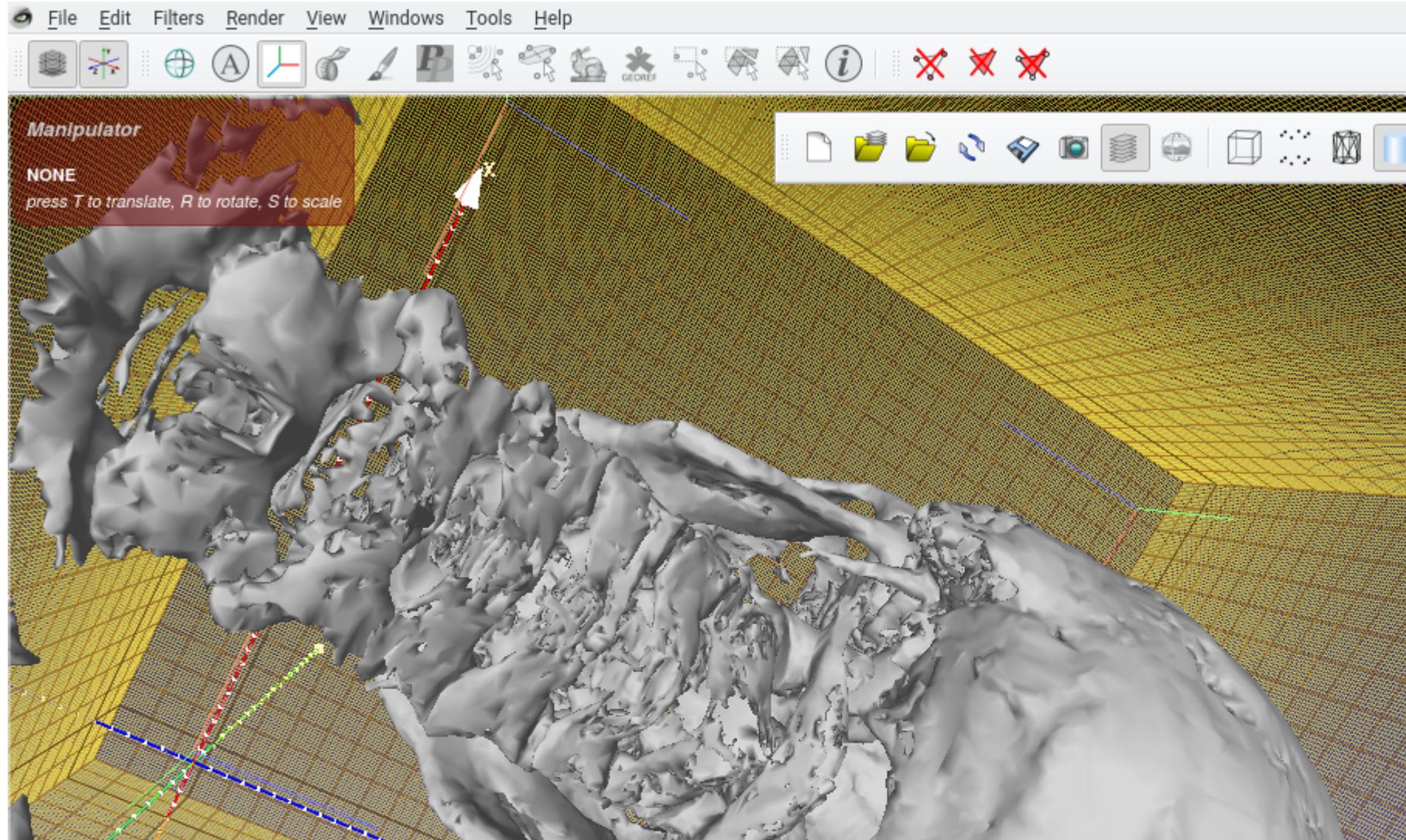
An Example of Inter-Application Networking

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 that 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

Please List your Previous Stays

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31	1					6
7	8					13
14	15					20
21	22					27
28	29					3
4	5					10

OK Print

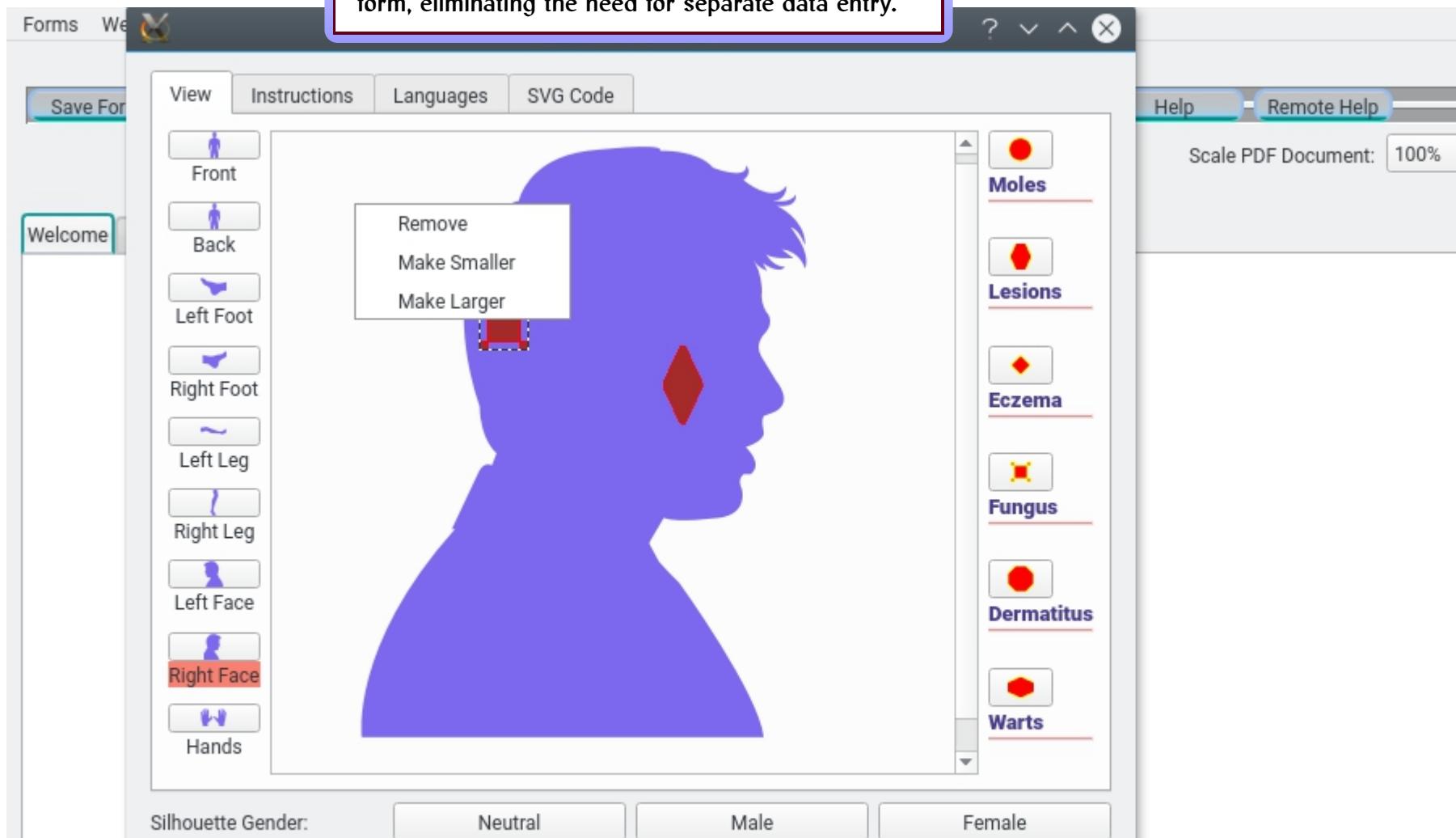
The screenshot shows a software interface for data collection. At the top, there's a menu bar with 'Forms', 'Web', 'Language', 'Help', and 'About'. Below the menu are several buttons: 'Save Form', 'Open Form' (which is highlighted in orange), 'Cloud Save', 'Cloud Open', and 'Submit Form'. There are also buttons for 'Page' (set to 0) and 'Search for' with a dropdown for 'Forwards'. On the left, there's a sidebar with tabs: 'Welcome' (selected), 'Web', 'X', '?', '^', 'X', 'Form Outline', and a note 'Click on a subheading to continue'. Below this are several red-highlighted sections: 'Patient Information', 'Chief Complaint', 'Review of Symptoms', 'Treatment History', 'Medical History', 'Current Medications', and 'Family History'. A central window titled 'ndp-main-outline <5>' contains fields for 'Referring Doctor' (Dr. New Test) and 'Referred By (Choose One)' (Clinical Specialist). It also has a date picker set to '1/9/16' and a calendar for 'January 2018' showing previous stays for 'Test 1' and 'Test 2'. At the bottom of the central window are 'OK' and 'Print' buttons.

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.

Also, submitted information is already in digital form, eliminating the need for separate data entry.



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 annotations: Arrows, Comments, Lists, Arcs, and Rulers. At the bottom are controls for Silhouette Zoom, Image Transforms, Annotations Transforms, and various movement and rotation tools.

Silhouette Zoom: Clear

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 product catalog. The main view displays a pair of brown leather high-top sneakers with white soles, set against a blue background. A context menu is open over the right shoe, listing options: Detach Image, Detach Noteboook, Detach Description, **Detach Everything** (which is highlighted), Merge Windows, Explore Color Matches ..., View 3D Model ..., Take Screenshot, View Item List, and View Shopping Cart. To the left of the main image, there's a vertical sidebar with three thumbnail images: a brown leather shoe, a grey knit shoe, and a person wearing dark jeans and sneakers. At the bottom left, there are navigation icons for up, down, and search. Below the main image, there are buttons for 'Item: 3' and 'Image Zoom' with a slider. At the very bottom, there are tabs for 'Overview' (which is selected), 'Features', 'Specs', and 'Reviews'. On the far right, there's a detailed product description for the 'Grand Crosscourt II Sneaker' and a section for 'Actions' with links to 'Add to Cart' and 'Explore Colors', along with two color swatches for the shoe.

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](#)

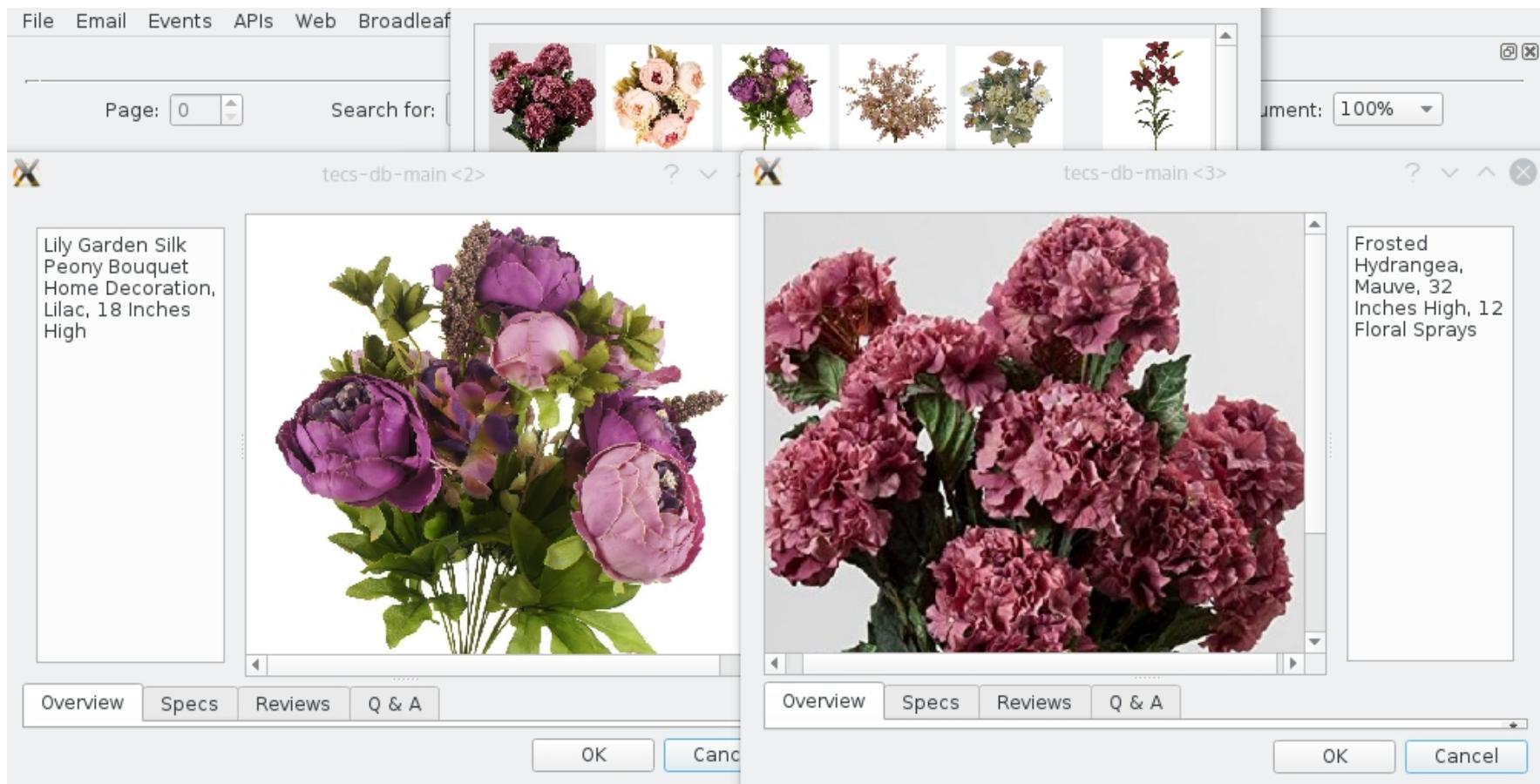
Item: 3 Image Zoom:

Overview Features Specs Reviews

- Leather upper
- Lace-up
- Round toe

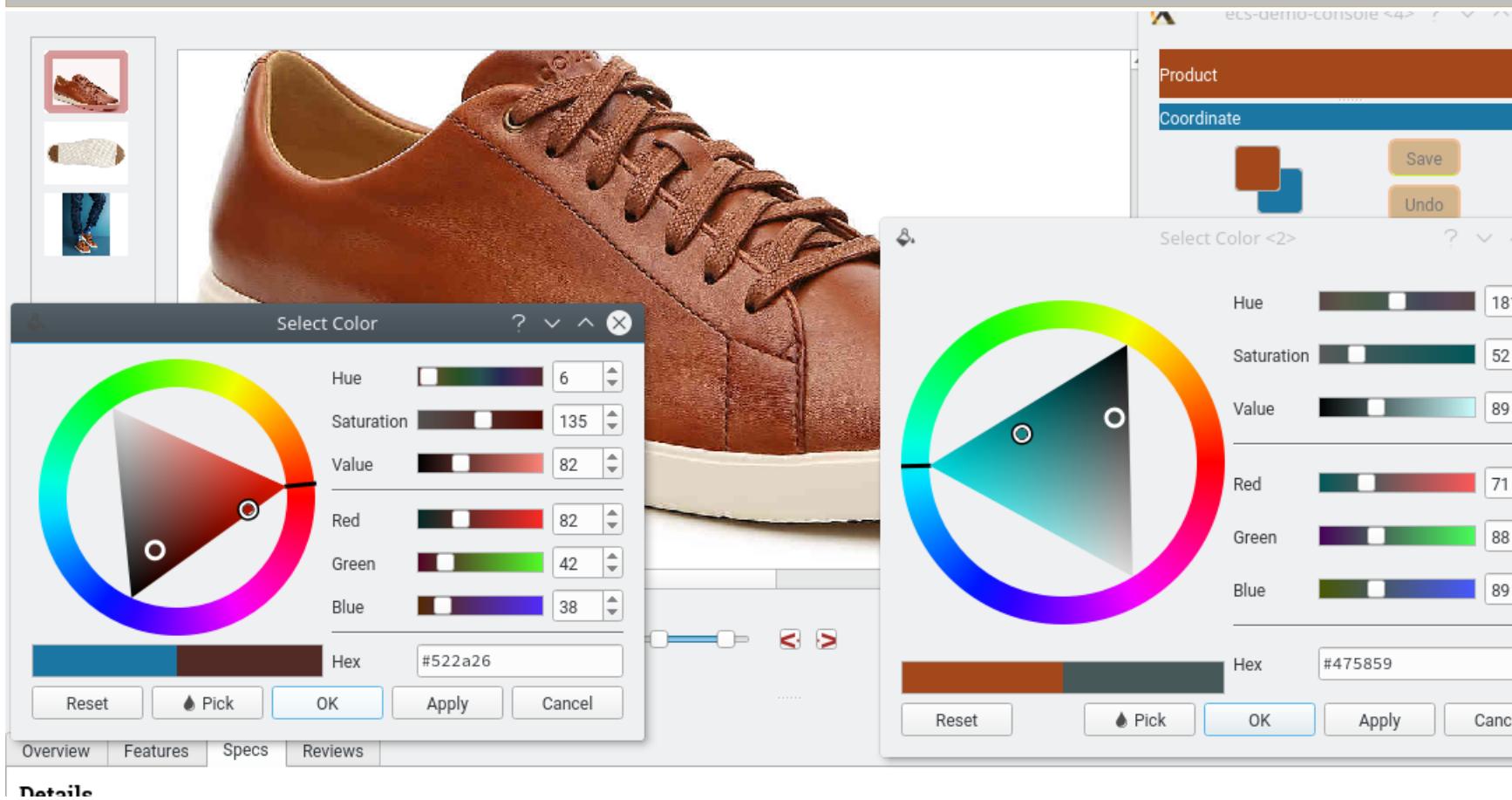
Interactive “Shopping Carts”

Instead of static lists, shopping carts 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. A specific thumbnail in the bottom row is highlighted with a red border and has an arrow pointing to it from a callout box. This callout box contains the text "Current Photo". To the right of the grid is a large image of a master bedroom with green walls, a wooden bed, and a chaise lounge. Below the image is another callout box containing the text "Color-Coded Groups". On the far left, there is a sidebar titled "Groupings" with a list of room categories, 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 (teal), Master Bedroom/Spa (light green), and Basement/Game Room (grey). The "Entrance/Foyer/Hall" group is currently selected, indicated by a teal bar. At the bottom of the interface, there are navigation buttons (left/right arrows), an item counter ("Item: 19"), an "Image Zoom" slider, and standard window control buttons ("OK", "Cancel").

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 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 a grid of thumbnails on the left and a large preview window on the right.

- Already Viewed (vertical color band):** A callout points to a thumbnail in the second row, third column, which has a vertical teal border. This indicates it has been viewed.
- Not Yet Viewed (horizontal color band):** Another callout points to a thumbnail in the fourth row, fifth column, which has a horizontal teal border. This indicates it has not yet been viewed.
- Current Photo (viewed for the second time):** A callout points to the large preview window on the right, which displays a living room interior with a brown sofa, a large ottoman, and a kitchen area in the background. The preview window has a thick teal border around its perimeter, and both its horizontal and vertical edges have vertical teal overlays, indicating it is the current photo being viewed.

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:

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

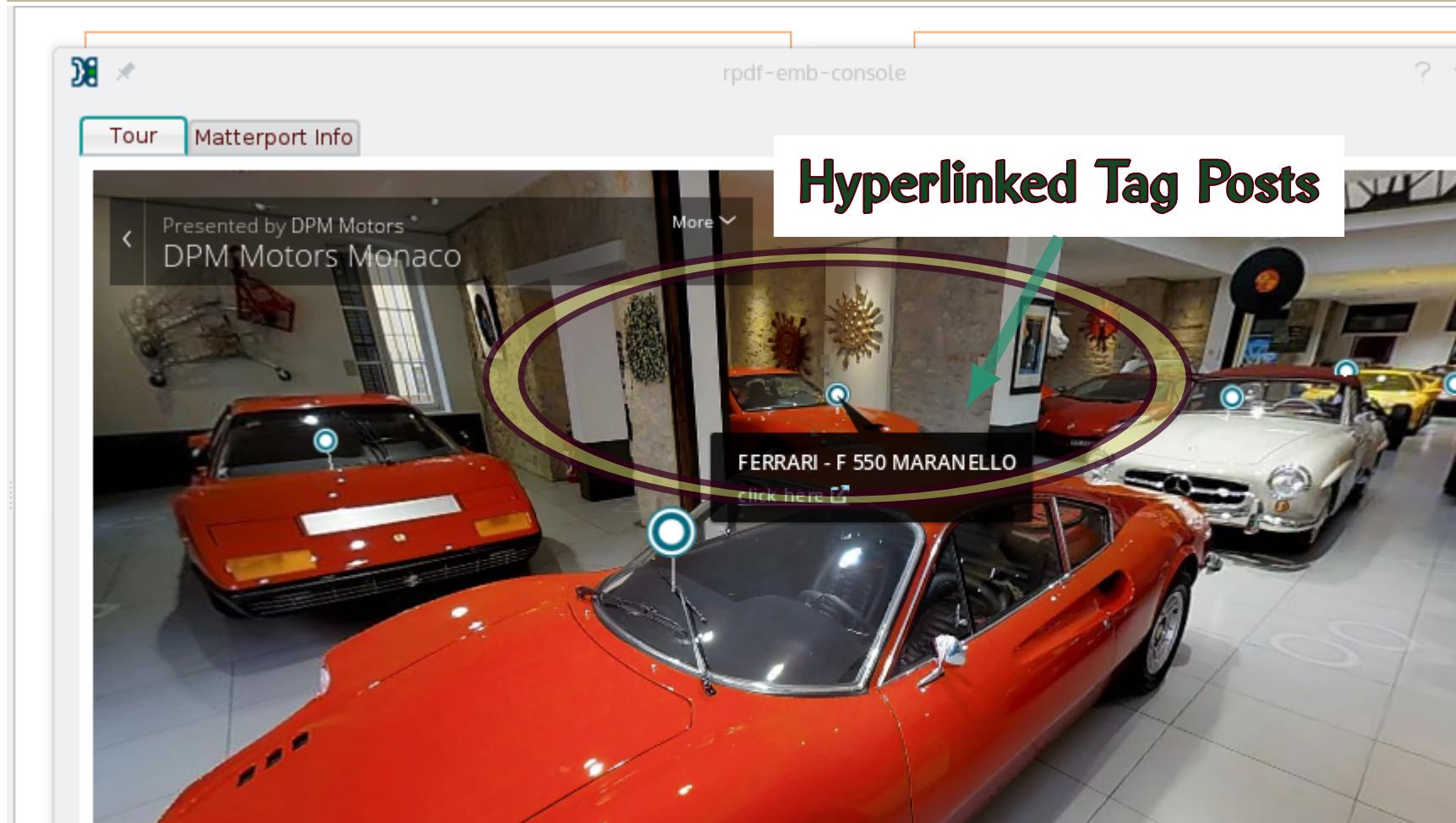
A green oval highlights the first item ('Entrance/Foyer/Hall'), and a red oval highlights the last item ('Basement/Game Room'). Arrows point from these highlighted items to labels: 'Visible Groups' above the first one and 'Hidden Groups' above the last one. The main viewing area displays a large image 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' indicator, an 'Image Zoom' slider, and 'OK' and 'Cancel' buttons.

Visible Groups

Hidden Groups

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 >](#)

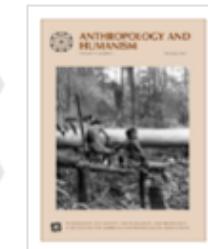
Ethnographer as Apprentice: Embodying Musical Knowledge in South India

da Weidman

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

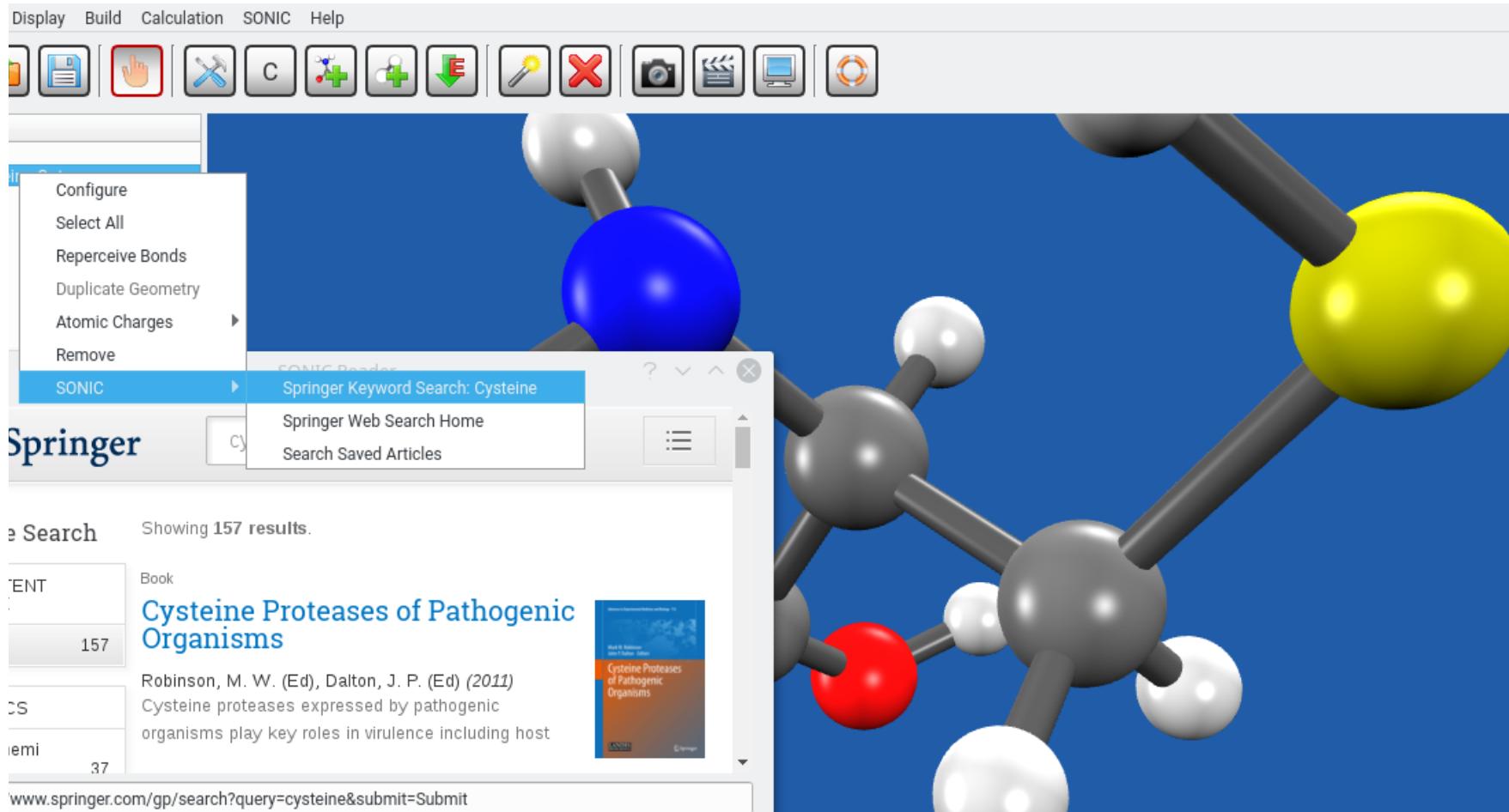
0.1111/j.1548-1409.2012.01131.x [View/save citation](#)

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 from the **Product Development** department.

Cite this object as

Medal; bronze; 1920-30

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. 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 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/

ScignSeer Video Player

ARKIVE
www.arkive.org

Moving images copyright
© BBC Natural History Unit

Sound recordings copyright
© BBC Natural History Unit
© Natural FX

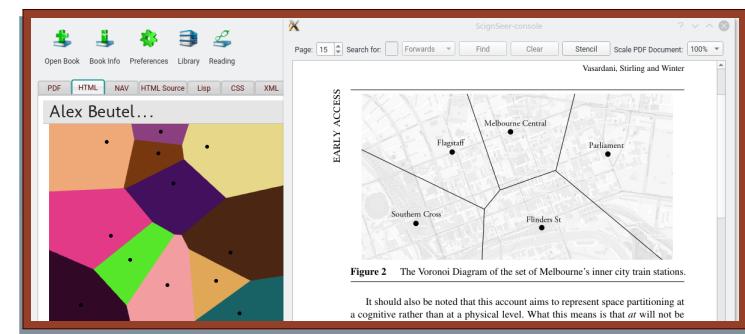
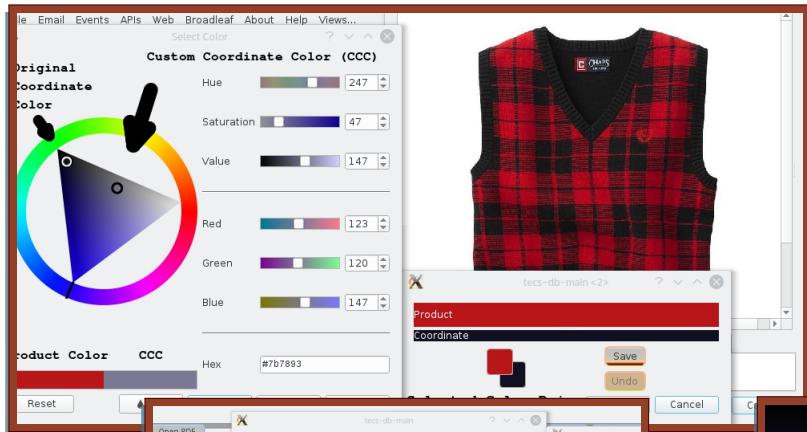
Restart Pause Play

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

OK Proceed Cancel

Thank You!

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



This screenshot shows a software application window. On the left, a sidebar lists categories: Clothing (Women, Men, Children, Boy, Maternity) and Electronic (Appliances, Video Games). The main area displays a "Sweater Vest (Cashmere)" product page with a 5-star rating, price \$117.50, and "On Sale \$69". A "Product Coordinate" dialog is open, showing a coordinate grid and a "Save" button. Another "Product Coordinate" dialog is also visible in the background.

