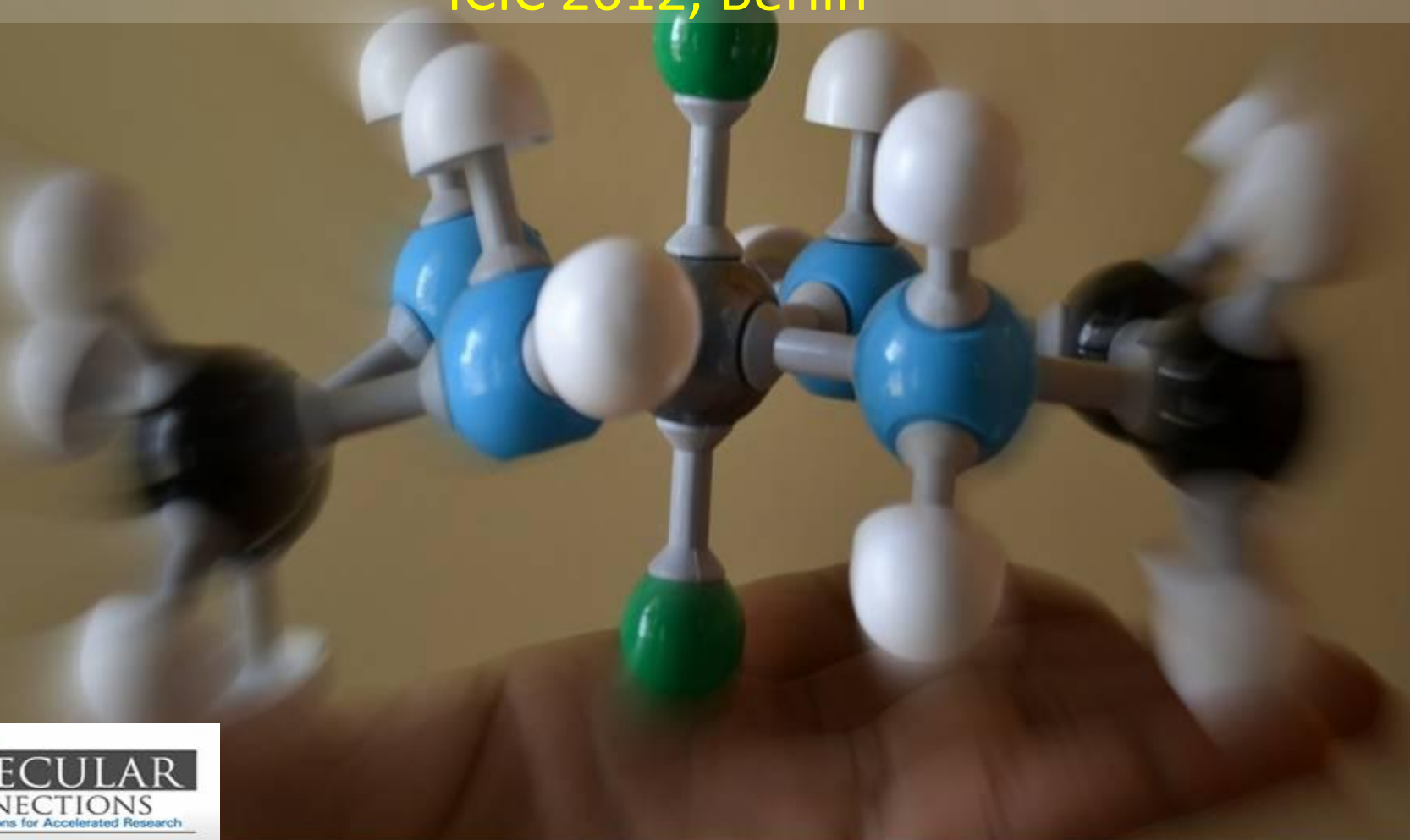


Smarter Content Delivery – Apps for Chemistry

Anirban Mudi, Jignesh Bhate

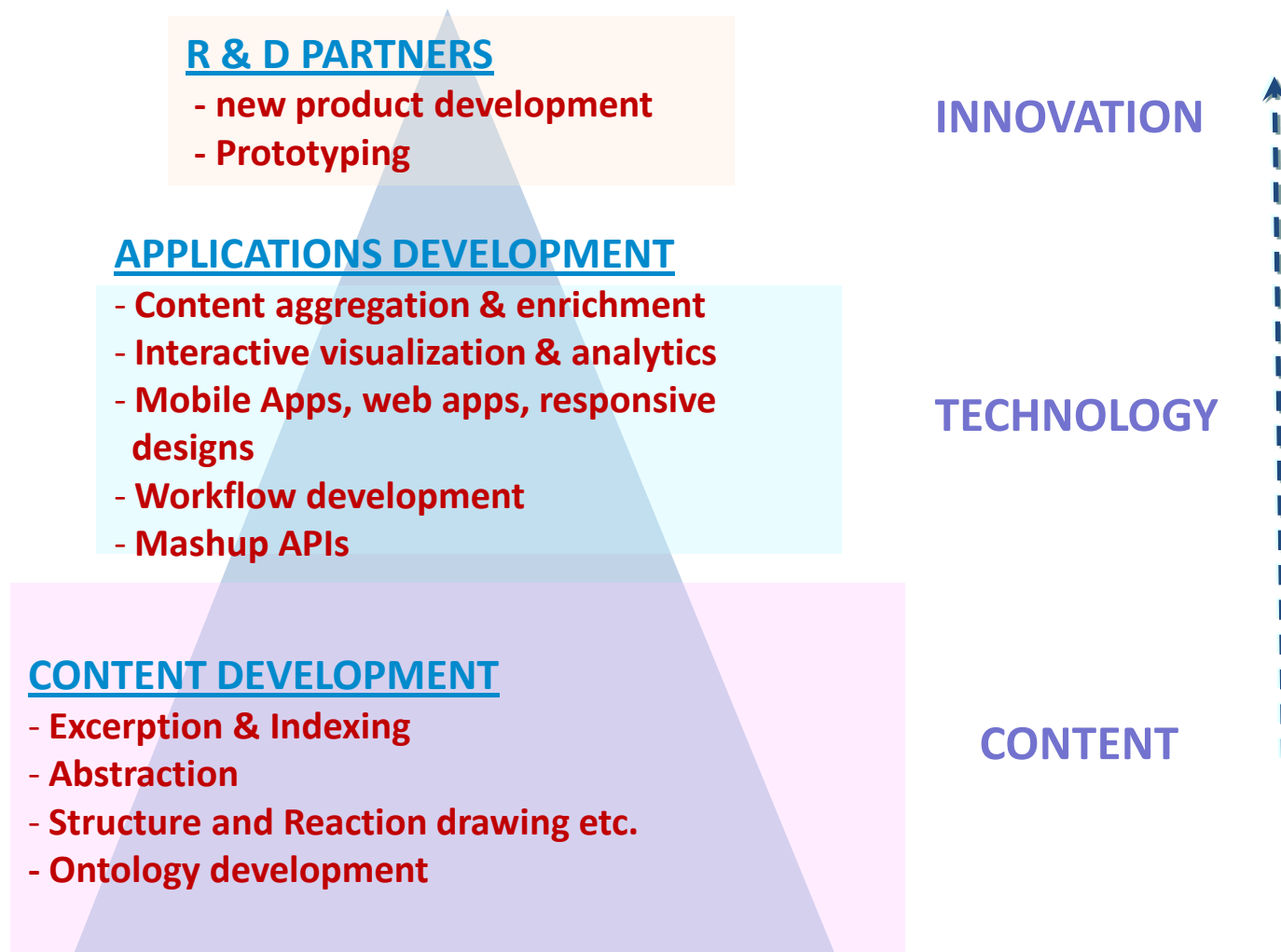
Molecular Connections, Bangalore, India

ICIC 2012, Berlin



- **Introduction of Molecular Connections**
- **Chemical Information Delivery : Trends, Challenges, Principles**
- **Impact of new technologies**
- **Heterogeneous publishing environment**
- **Use cases & Our learnings**

Molecular Connections - Value Proposition



Trends, Challenges & Guiding Principles for Chemical Information Delivery

Next Generation of Chemistry Publishing

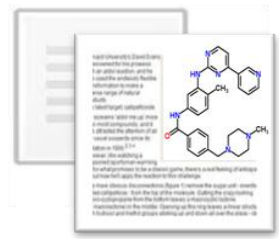


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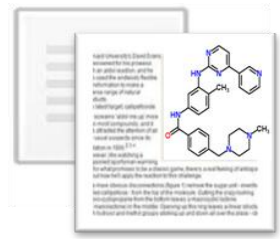
post-PC world



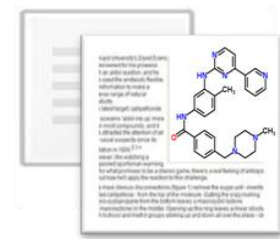
3



2



1



Mobile Apps in Chemistry – Some Statistics

As per App store search using the keyword “chemistry”

App Store	Type	No. of Apps
Apple	iOS	398(iPad), 681 (iPhone)
Google Play	Android	> 1000

Mobile Apps in Chemistry – Category wise Distribution

Overlaps across categories are present

Category	No. of Apps in iPhone	No. of Apps in iPad
Reference	252	131
Education	547	329
Productivity	60	44
Utility	100	49
News	13	13
Business	14	13
Books	34	32
Catalogues	None	2
Entertainment	71	29
Games	86	54
Health & Fitness	10	4
Lifestyle	17	5
Medical	59	28
Navigation	1	1
Newsstand	1	3
Photo & Video	3	1
Social networking	4	3

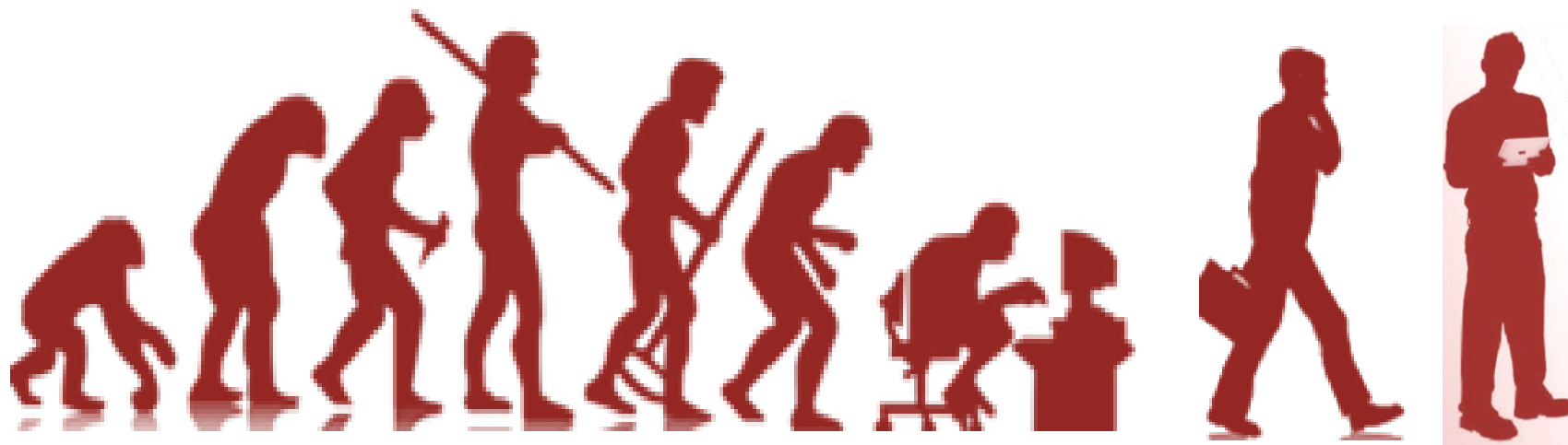
Use of Mobile Apps in Chemistry

- Read journal articles
- Access databases
- Chemistry References (reaction mechanisms, drugs etc.)
- Draw structures
- Calculations
- Laboratory instrumentation
- Ebooks

....And Many More Innovative Apps Coming up

Mobility is Intrinsic in Humans

Need chemical information
anywhere, anytime –
travelling, classroom, lab, conference



By 2013, mobile devices will overtake PCs as the most common web access device worldwide

Source : Gartner

Evolution of User Interfaces

- Command Line Interface (CLI)
- Graphical User Interface (GUI)
- Natural User Interface (NUI)
- Organic User Interface (OUI)

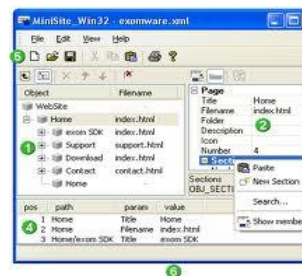


Image sources :

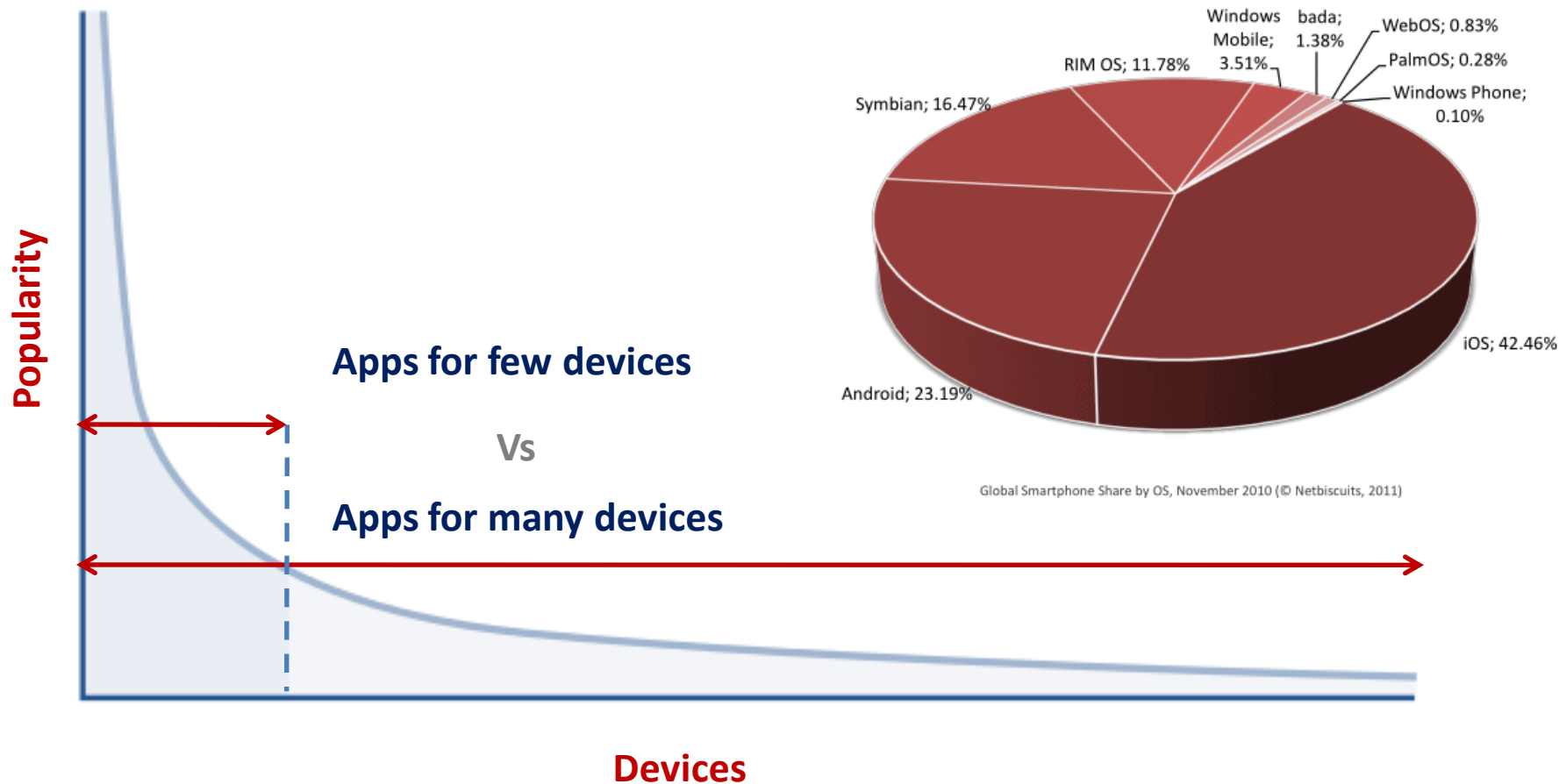
<http://blog.makezine.com>

<http://exomware.com>

<http://www.electrosome.com/microsoft-surface-technology/>

<http://www.greensource.com/news/nokia-flexible-user-interface-prototype/>

Long Tail Vs Short Tail – Apps for which Device ?



Consumption Vs Production

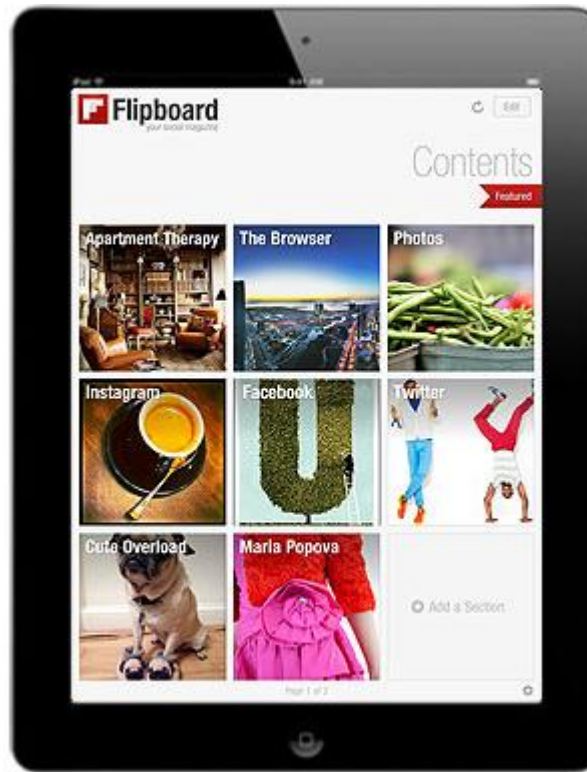
- **Consumption of content** - Users prefer consuming content on mobile devices
- **Production of Content**
 - Drawing chemical structures is central to chemistry, but doing so on a mobile device is difficult (no mouse, no keyboard, variable environment)
 - Structure/Text input is tough



Many Mobile Inputs

- **Sensors (accelerometers, multitouch sensors etc.)**
- **Camera (Photos, QR codes etc.)**
- **GPS**
- **Voice recognition**
- **Sound Recorder**
- **Near Field Communication**

Content is the New UI – Touch Based Examples



Content is the New UI – Non-Touch Based Example



Examples of Chemistry Apps Using Various Mobile Device Functionalities

Touch Based Journal Articles Reader Apps

ACS Publications
MOST TRUSTED. MOST CITED. MOST READ.



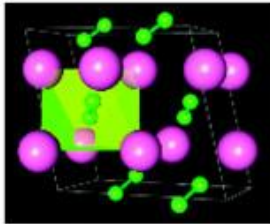
ACS Mobile
Latest Research and News

Tap to Continue

ACS ASAPs Filter

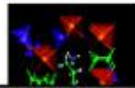
February 02, 2010

Nature of N–N Bonding within High-Pressure Noble-Metal Pernitrides an...
Michael Wessel and Richard Dronskowski



47 minutes ago J. Am. Chem. Soc.

Mixed Anion (Phosphate/Oxalate) Bonding to Iron(III) Materials
Fiona R. Kizewski, Paul Boyle, Dean Hesterberg and James D. Martin



ACS ASAPs My ASAPs Latest News Search More

My ASAPs My Abstract Delete Share

Smallest Electrical Wire Based on Extended Metal-Atom Chains
Te-Wei Tsai, Qian-Rui Huang, Shie-Ming Peng and Bih-Yaw Jin
Department of Chemistry and Center for Theoretical Sciences, National Taiwan University, Taipei, Taiwan, Republic of China

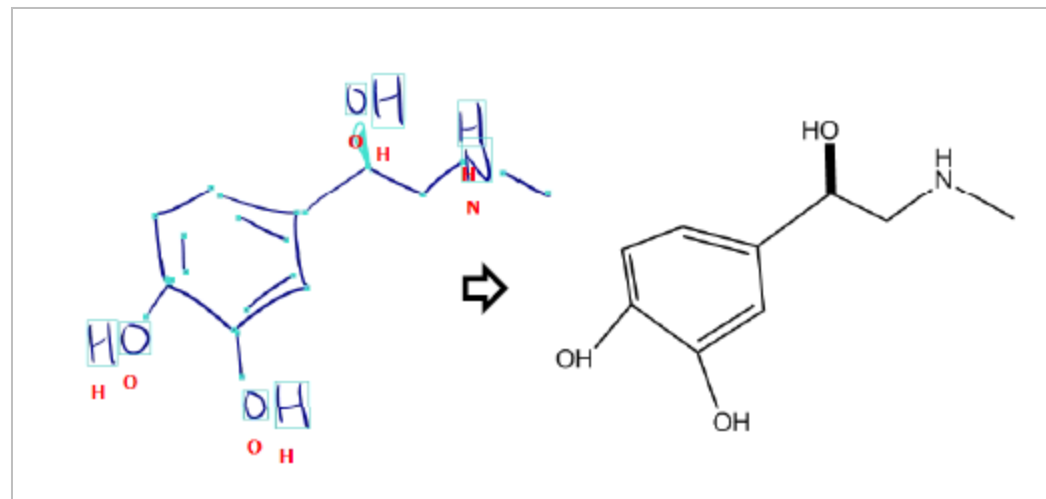
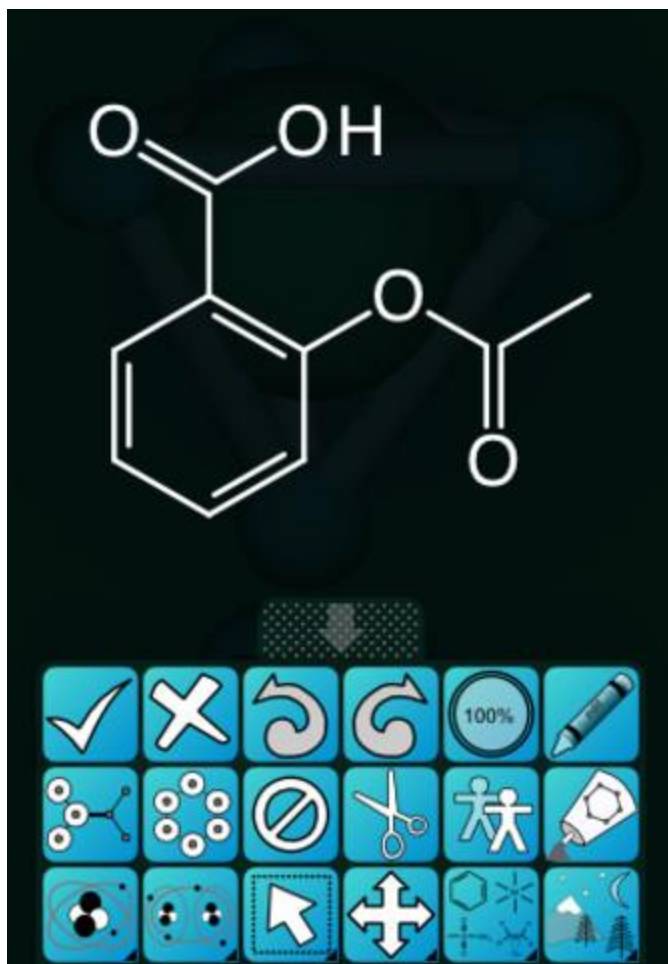
J. Phys. Chem. C
DOI: 10.1021/jp907893q
Publication Date (Web): February 4, 2010
Copyright © 2010 American Chemical Society

Abstract



Full Text ⏪ ⏩

Touch Based Chemical Structure Editor

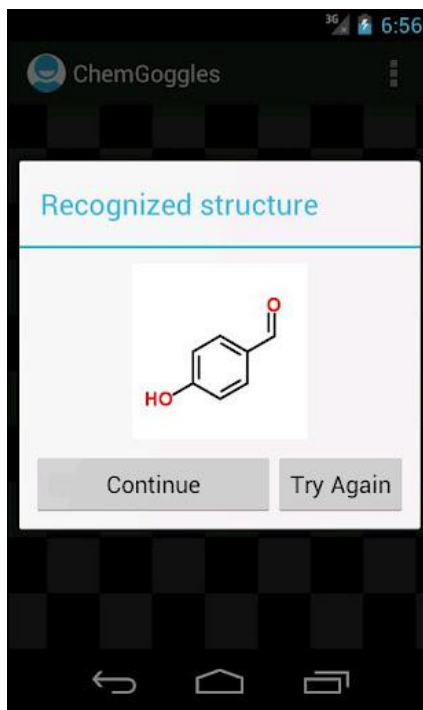


ChemInk

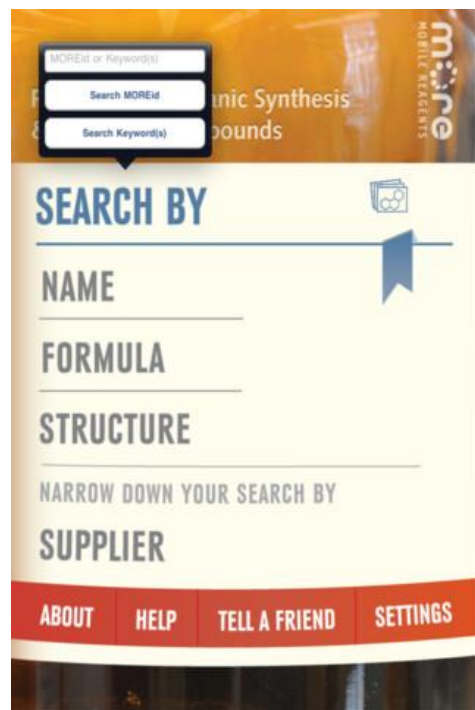
<http://groups.csail.mit.edu/mug/projects/chemink/>

MMDS <http://molmatinf.com/>

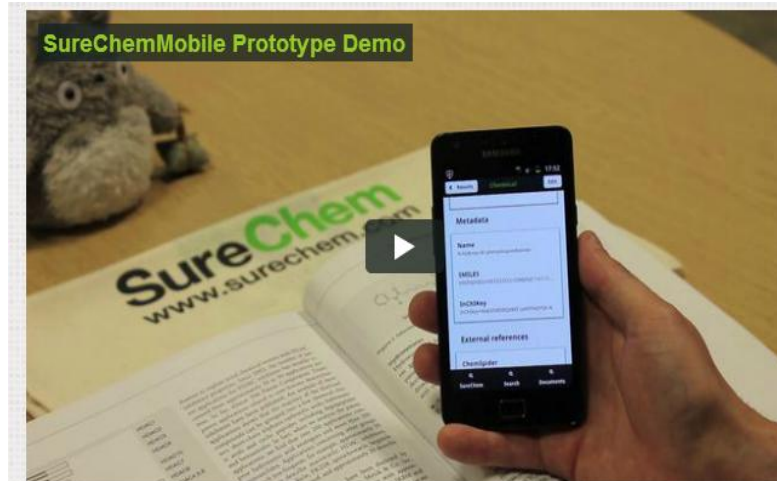
Chemistry Apps Using Camera



ChemGoggles
(RSC)



MobileReagents
(Eidogen-Sertanty)



SureChemMobile Prototype Demo from Digital Science on Vimeo.

SureChemMobile
(SureChem)

Molecular Connections also has a mobile app to recognize structures in images and display related metadata

Chemistry Apps Using Camera

The image shows a person holding a tablet that displays a Wikipedia page for Scandium. The page includes the title "Scandium", a note that "Element 21" redirects here, a periodic table highlighting Scandium (Sc), and a photograph of the element. In the background, a large periodic table of elements is visible, with a QR code on the Boron (B) element. A legend explains the color coding: Black = Solid, Red = Liquid, Blue = Gas, and Grey = Unknown. A callout box for Boron lists its Atomic Number (1), Atomic Symbol (B), Relative Atomic Mass (10.811), and Element Name (Boron). Other callouts point to QR codes for "Scan the QR code to learn more" and "Border Shows Element Description".

Some Element Categories In The Periodic Table

Inner T

WALLS
wall.globe.fr

QR-enabled Periodic table of the Elements

<http://www.geeksareshy.net/2012/09/06/periodic-table-wall-graphics-with-qr-codes/>

Voice Recognition – Search Without Typing



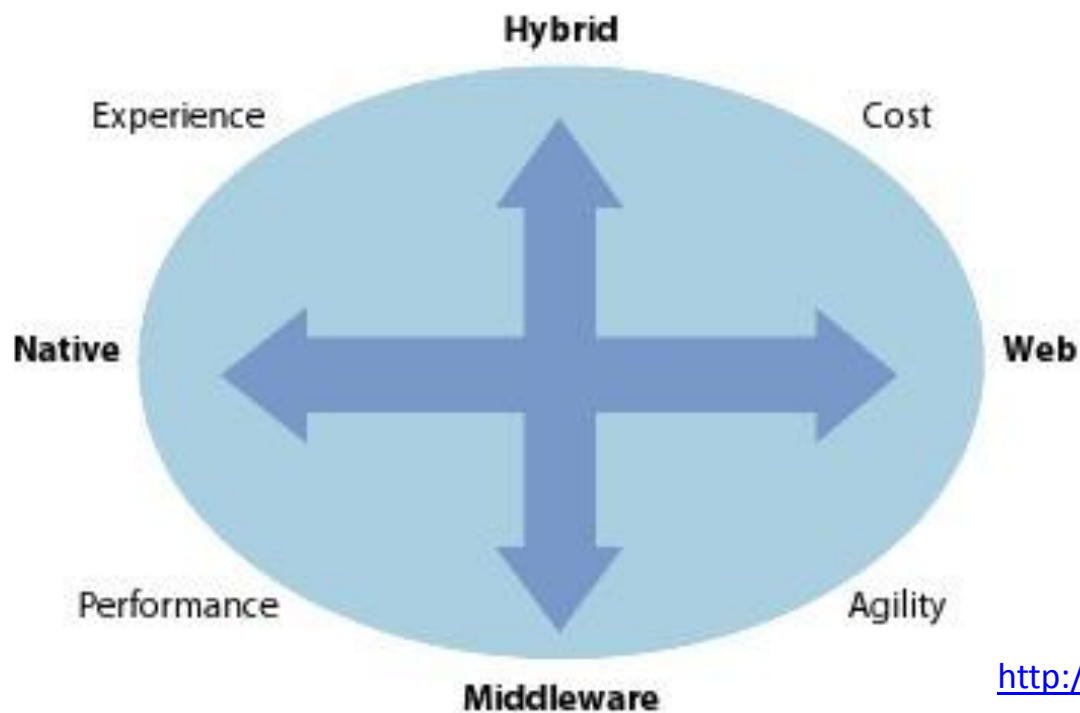
Apps Using GPS – Some Ideas

- **Learn about chemistry research in your neighborhood**
 - research, researchers, institutions
- **Find local chemical industry news, conferences**
- **Locate local chemical vendors**

Making Choices in Mobile App Development

Native App Vs Other App Development Approaches

Figure 1 There Are Four Mobile Application Development Choices, With Many Variants



<http://www.readwriteweb.com>

61154

Source: Forrester Research, Inc.

Molecular Connections has extensive experience in developing Apps with all these approaches

Designing for Everywhere – Responsive HTML5 Templates



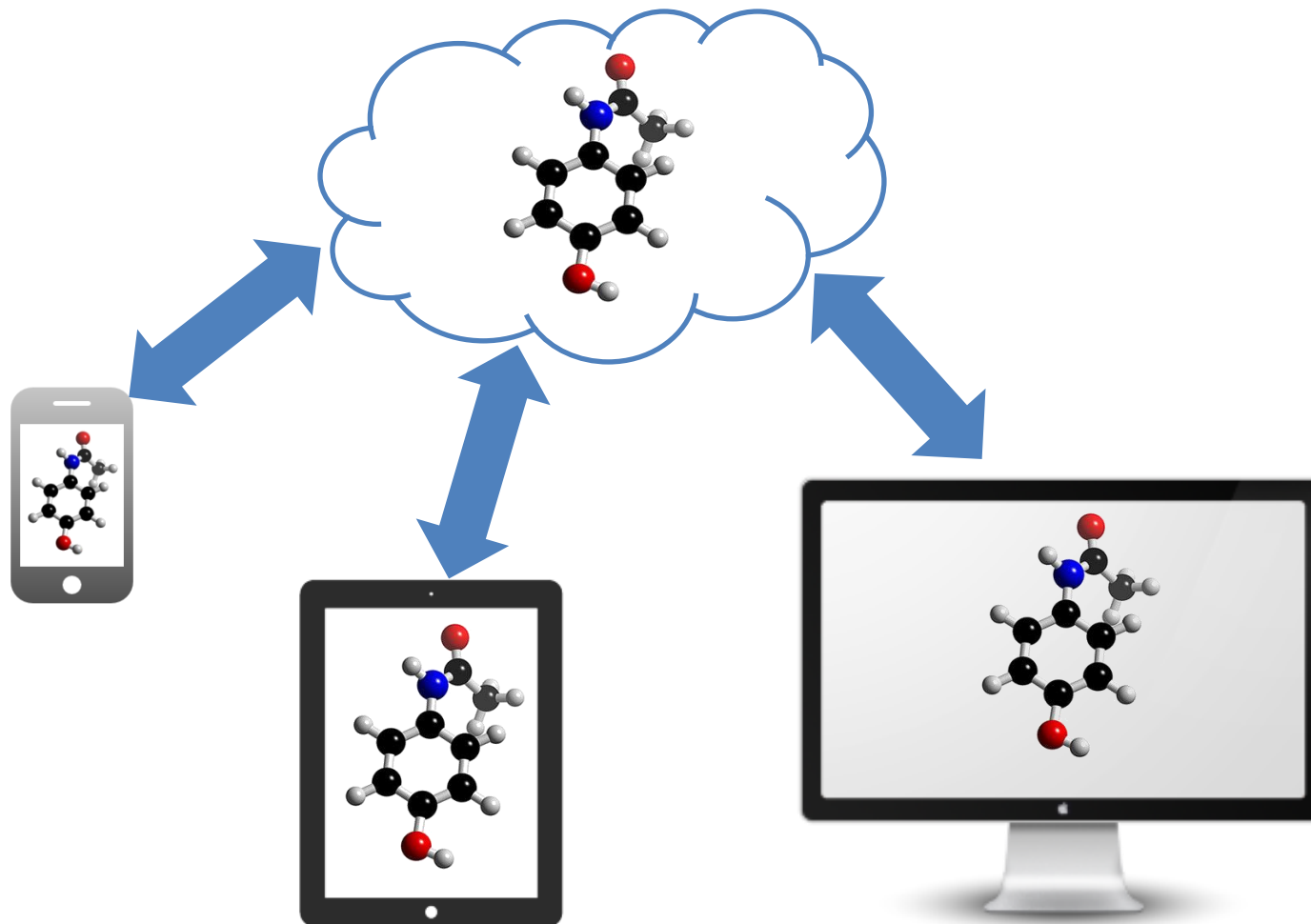
▪ Difficult to manage multiple websites for multiple devices – why not make a single responsive website ?

Molecular Connections designers have created a set of responsive templates which can be easily customized for integrating in prototypes and products

<http://pixelicity.com>

Impact of New Technologies

Cloud Computing



Public cloud computing market to be \$109 bn globally in 2012

Source - Gartner

Augmented Reality – Example 1

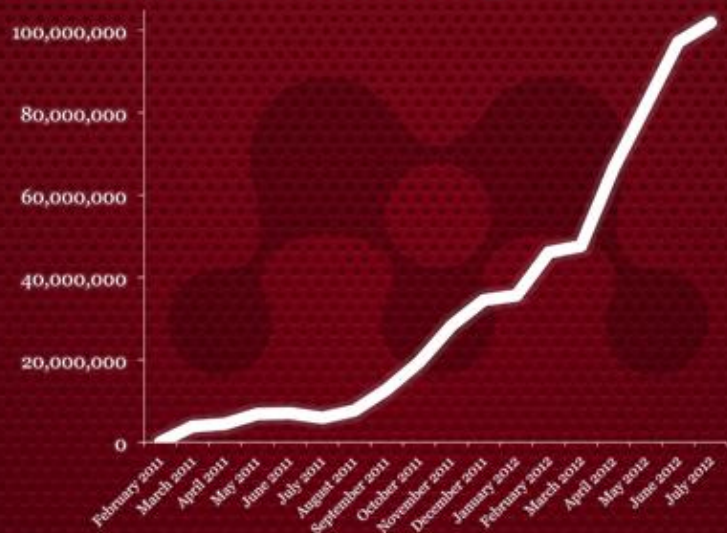


Over 2.5 billion Mobile Augmented Reality Apps to Be Installed Per Annum by 2017

Source - Juniper research

Rise of the APIs

Mendeley API Calls per Month



- 100 million API calls per month
- 240 third party-apps



Spread your research!

- Kleenk uses Mendeley, PLoS, Springer APIs to enable users to link their paper with other papers



- Altmetric uses Mendeley, Twitter, PLoS APIs to measure impact of research papers

Heterogeneous Publishing Environment is a Challenge

- Multiple devices
- Multiple input/output
- Multiple screen sizes
- Multiple OS
- Multiple channels
- Variable environment due to mobility
- Dynamic & personalized content
- User preferences



Use Cases

Use Case – Using APIs to Develop New Product/Services



The AskXtractor SearchAssist application provides auto-complete options for a user's search query leveraging Molecular Connection's proprietary knowledgebase



Journal Trends enables interactive visualization of trends in Elsevier journals related to keyword search by a user

These web apps are available via SciVerse Application Gallery

Many other innovative web & mobile apps using APIs of publishers are in the Molecular Connections pipeline

Use Case – Xtractor Android App

Xtractor

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Search

A platform for analysis of annotated facts obtained from millions of PubMed abstracts.

Search your article from :

- Abstracts - 4 million
- Proteins - 16355
- Drugs - 1381
- Processes - 4595

Last updated on July 2011
A product by Molecular Connections(P) Ltd

For any further queries, please contact :
info@molecularconnections.com

Xtractor

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Search

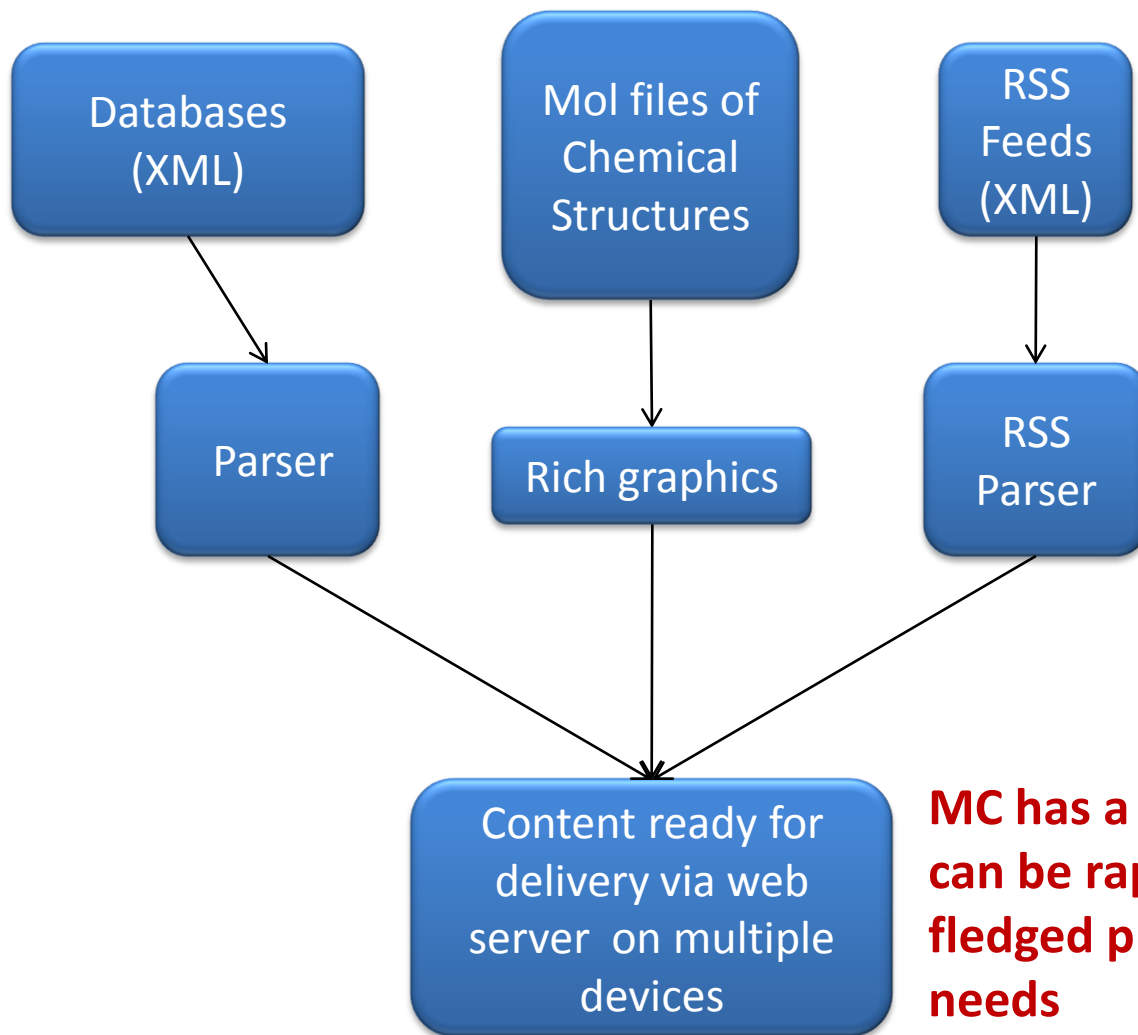
11 12 13 14 15 16 17 18 19 20

PMID : 20133149

TITLE : Adjuvant endocrine therapy in postmenopausal breast cancer patients: does hormone receptor status influence decision-making?

ABSTRACT : Hormonal therapy, such as **tamoxifen** (TAM), is the cornerstone of adjuvant treatment for women with surgically resected early **breast cancer** that is hormone receptor-positive (HR+), typically defined by **breast tumors** that express the **estrogen receptor** (ER), the **progesterone receptor (PgR)**, or both. TAM can have both estrogen-antagonistic and estrogen-agonistic effects, and expression of growth factor receptors such as human **epidermal growth factor receptor** (HER)2 in **breast cancer** is associated with the development of TAM resistance. Studies also suggest that a lack of **PgR**

Use Cases – Industry News App



MC has a working prototype which can be rapidly transformed into a full fledged product to meet publisher needs



Designing for Different Screen Sizes – Example

Highly personal, highly mobile

Less personal, less mobile



News360
snapshot



Optimal usage of the real estate is important for delivering better user experience

Molecular Connections has several apps which works on multiple devices

Sneak Peek at Some of the Upcoming MC Apps

- News app for latest articles on science topics
- Chemical structure recognition
- Interactive visualization showing a mash up of citation data and chemical information
- App to create compliance reports, MSDS etc. using regulatory information from a chemical database
- App to augment printed content

Learnings from MC Experience

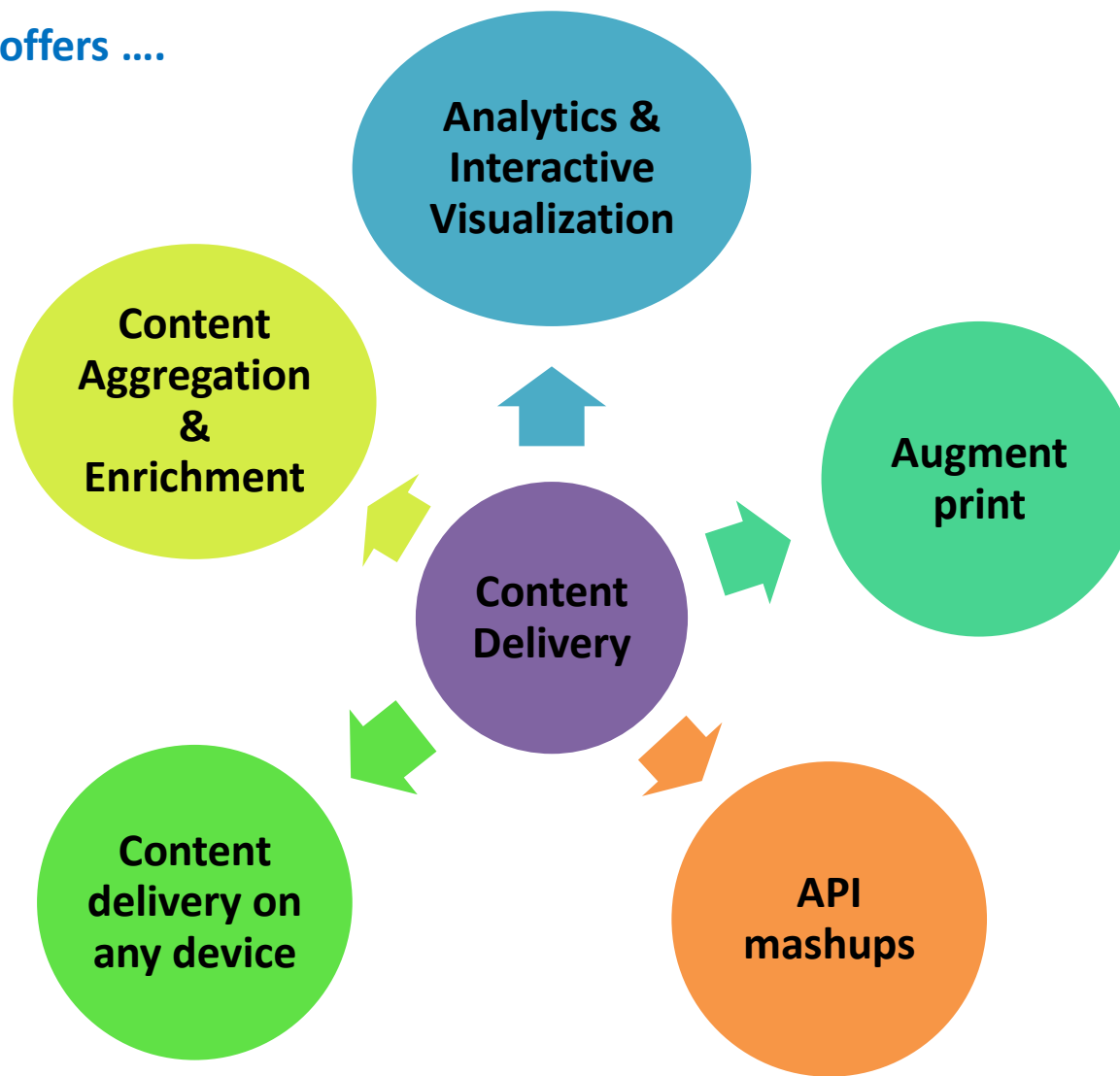
- **Need to optimize distribution of processes between server and app**
- **Dynamic handling of numerous content format**
- **Dealing with frequent upgrades to software & hardware**
- **Speeding app development life cycle**

From a vendor's perspective

- **Define the scope upfront as much as possible**
- **Landscape is evolving – but 2 minds are better than one**
- **Look at full cycle costs**

Content Delivery Solutions for Publishers

Molecular Connections offers



- **Rapid development of products, prototypes**
- **Rich experience in web & mobile apps development for publishers**

Thank You