

Achieving Better Buying Power through Acquisition of Open Architecture Software Systems for Web-Based and Mobile Devices

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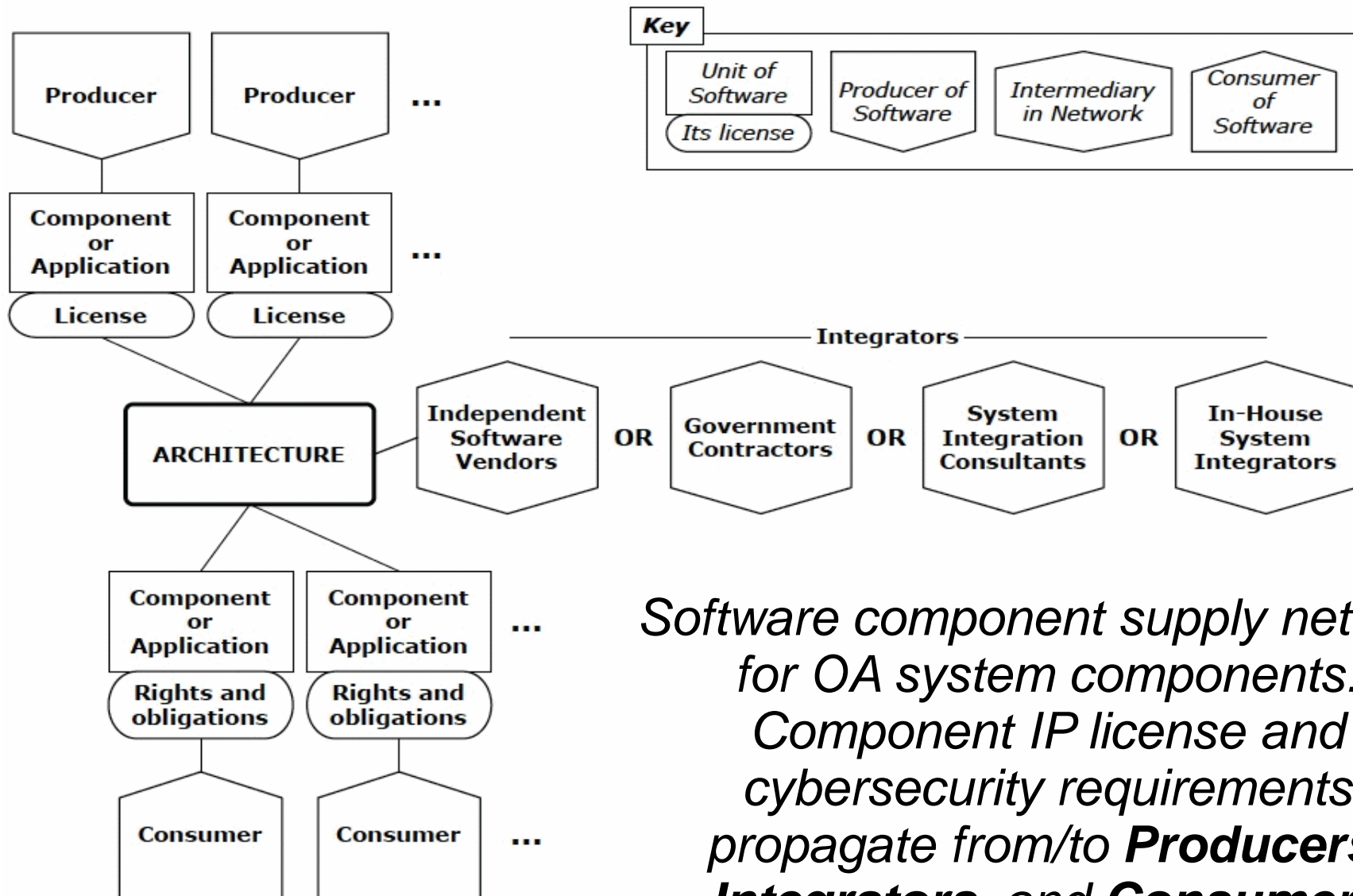
Overview

- Recent trends in open architecture (OA) software systems
- Emerging challenges in achieving *Better Buying Power* (BBP) via OA software systems for Web-based and Mobile devices
- New practices to realize cost-effective acquisition of OA software systems
- Conclusions

Recent trends in OA software systems

- Multi-party acquisition and OA development ecosystems
- Shared development of Apps and Widgets as OA system components and capabilities
- Growing diversity of challenges in cybersecurity
- New business models for OA software component development and use

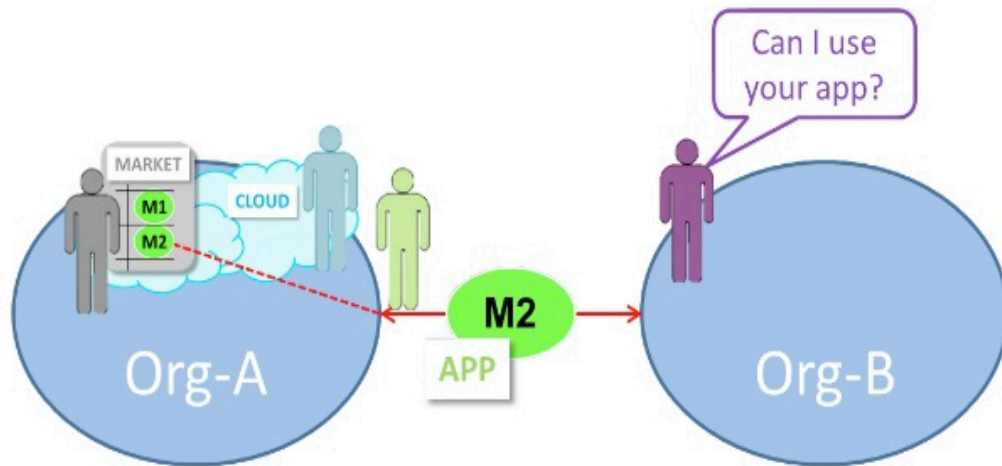
Multi-party acquisition and OA development ecosystems



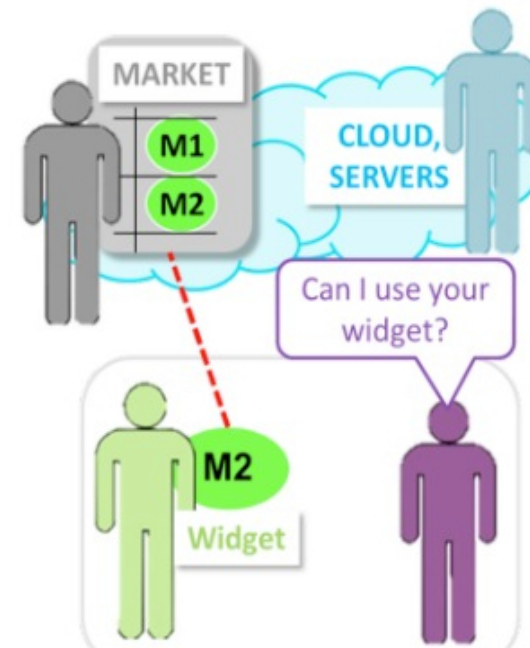
*Software component supply network for OA system components: Component IP license and cybersecurity requirements propagate from/to **Producers, Integrators, and Consumers***

Multi-party acquisition of *assembled capabilities* within OA development ecosystems

Mobile Reciprocity



Multi-Party Interactions



Consumer/End-User Organizations seeking ways to reduce acquisition cost and effort through shared development/use of common OA software system components (proprietary/open source Apps, Widgets).

Shared development of Web-based Apps and Widgets as OA system components

The screenshot displays a web-based dashboard titled "Widget Framework" running in a Mozilla Firefox browser. The dashboard is divided into several panels:

- Mission Status:** A sidebar on the left showing a list of services and their counts:
 - Applications: Collaboration (11), COP (7), DGGS (7), E-mail (5), Messaging (7), Web (9)
 - Data Network Services: CENTRIXS (7), Internet (11), NIPRNET (7), SI COMMS (9), SIPRNET (9), TADILS (7)
 - Video Network Services: JWICS (4), VIXS (7), VOIP (Video) (7), VTC DVS-G (1)
 - Voice Network Services: DRSN (9), DSN (5)
- Raven Hosts Viewer:** The central panel displays a network diagram titled "Raven Network Assets" with a central node "njlan" and various peripheral nodes connected by lines. A table titled "Raven Assets" is visible on the right side of this panel, listing host names and IP addresses.

State	Host Name	IP
Green	10.2.0.15	10.2.0.15
Red	10.2.0.31	10.2.0.31
Purple	10.2.0.77	10.2.0.77
Purple	10.2.0.78	10.2.0.78
Purple	10.2.0.81	10.2.0.81
Purple	10.2.0.86	10.2.0.86
Purple	10.2.0.87	10.2.0.87
Purple	10.2.0.89	10.2.0.89
Red	10.2.0.92	10.2.0.92
Purple	10.2.0.95	10.2.0.95
Purple	BILL-LAP.prowan.net	10.2.0.57
Green	FTPNI.prowan.net	10.2.0.254
Purple	NJ-BDC.prowan.net	10.2.0.27
Purple	NJFAX.prowan.net	10.2.0.4
Purple	NJFILES.prowan.net	10.2.0.3
Green	NJ-VPN-220.prowan.net	10.2.0.220
Green	NJ-VPN-221.prowan.net	10.2.0.221
Green	NJ-VPN-222.prowan.net	10.2.0.222
- BMC Remedy Trouble Ticket:** A panel on the right showing a form for creating a trouble ticket, including fields for Creator, Title, Description, and Cross reference.

The browser's address bar shows the URL: <https://raven-s-6576/https://raven-s-6576:8443/owf/#guid=92b15a46-12eb-40b2-8bfa-feab943cb3c3>. The system tray at the bottom indicates the time is 9:40 AM on 3/1/2012.

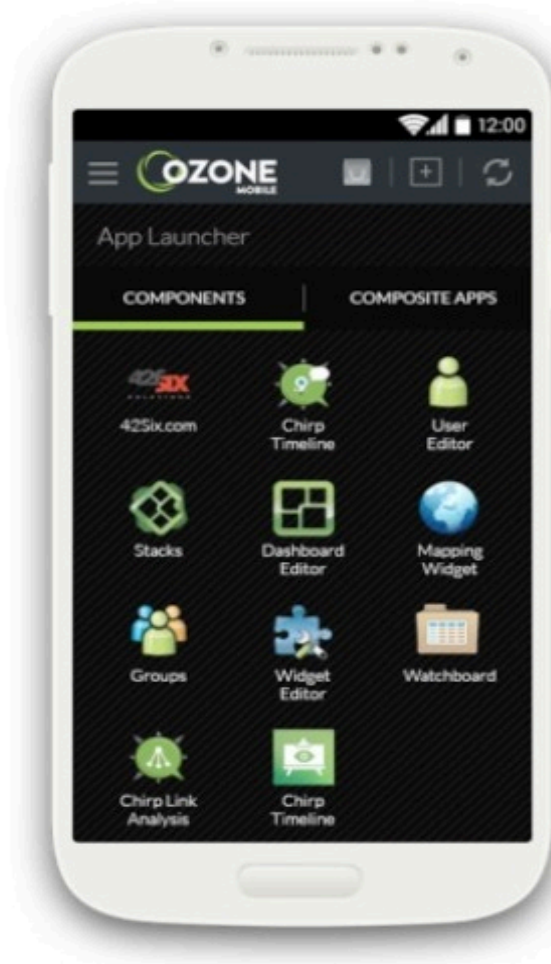
Widget Framework for Web-based PCs

Shared development of Mobile Apps and Widgets as OA system components

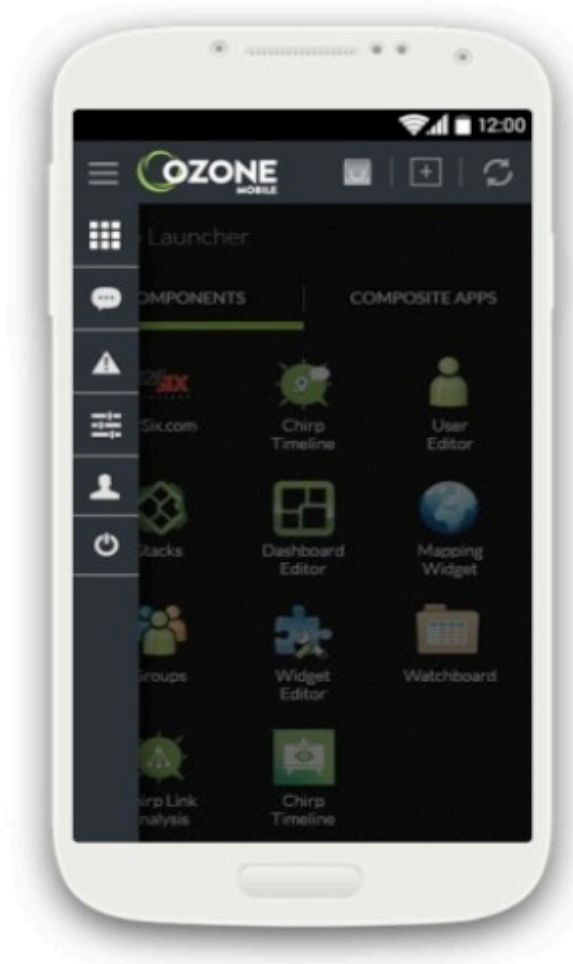
CAS Sign In



App Launcher



Ozone Mobile Drawer Menu



Ozone Widget Framework for Mobile Devices

Assemble capabilities using Apps/Widgets from trusted parties via sharing agreements

The screenshot displays the GEOINT App Store interface. At the top, there is a navigation bar with the GEOINT APP STORE logo, a search bar, and 'Sign Up' and 'Sign In' buttons. Below the navigation bar, the main content area is divided into a left sidebar and a main content area. The sidebar contains filters for 'Product Type' (Android Application, Desktop Application, iOS Application, Web Application), 'Agency' (Dept of Defense, DigitalGlobe, DOI, NASA, NGA), and 'Category' (Analysis, Collaboration, Collection). The main content area features a 'Featured' section with a 'Submit App Idea' button and a list of featured apps. Below the featured section is a grid of 'All' apps, each with a thumbnail, title, views/launches, and a star rating.

GEOINT APP STORE EXPLORE MORE

Sign Up Sign In Search

GEOINT App Store Home About

Featured

Submit Ideas 1 New Apps! 3 First Responder Apps 3 Mariner Apps 3 Aviator Apps 2

Nepal Disaster Response 8

Submit App Idea
45 Views
7 Launches
★★★★★

Refine by

Product Type

- Android Application (7)
- Idea (11)
- iOS Application (4)
- Web Application (17)
- Web Service (8)

Agency

- Dept of Defense (1)
- DigitalGlobe (1)
- DOI (1)
- NASA (1)
- NGA (16)
- + choose more

Category

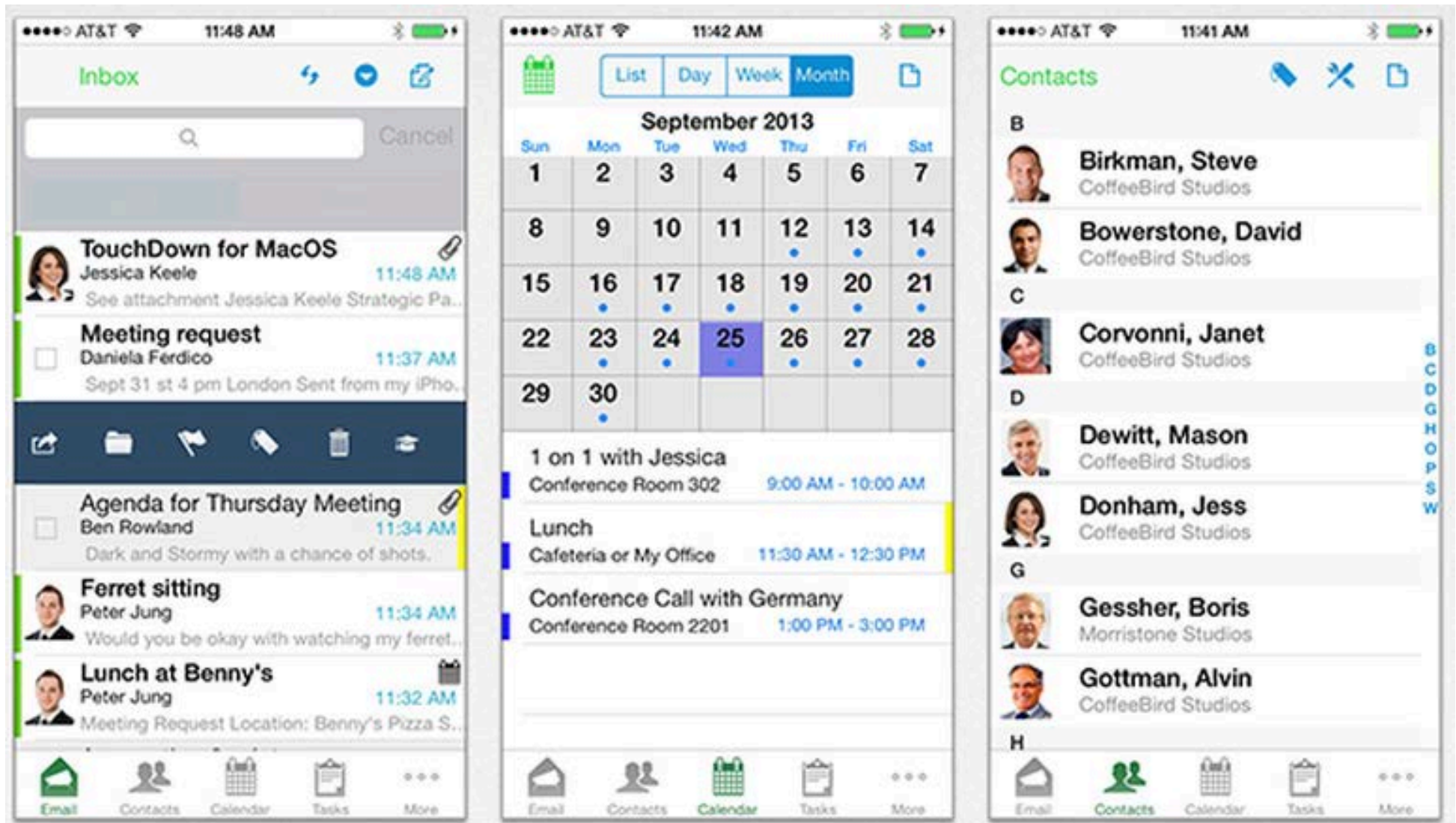
- Analysis (1)
- Collaboration (6)
- Collection (2)

All Sort By ▾

App Name	Views	Launches	Rating
USMC NAWCWD ...	1076		★★★★★
R3 Active Events ...	788	78	★★★★★
MSP GeoTrans	1224	44	★★★★★
GEOINT App Stor...	339	62	★★★★★
GEOINT App Stor...	274	25	★★★★★
EOSDIS Worldview	796	87	★★★★★
Avenza PDF Maps	904		★★★★★
Disaster Atlas	749	73	★★★★★
NGA POD	1299	32	★★★★★

Widgets available within App Store

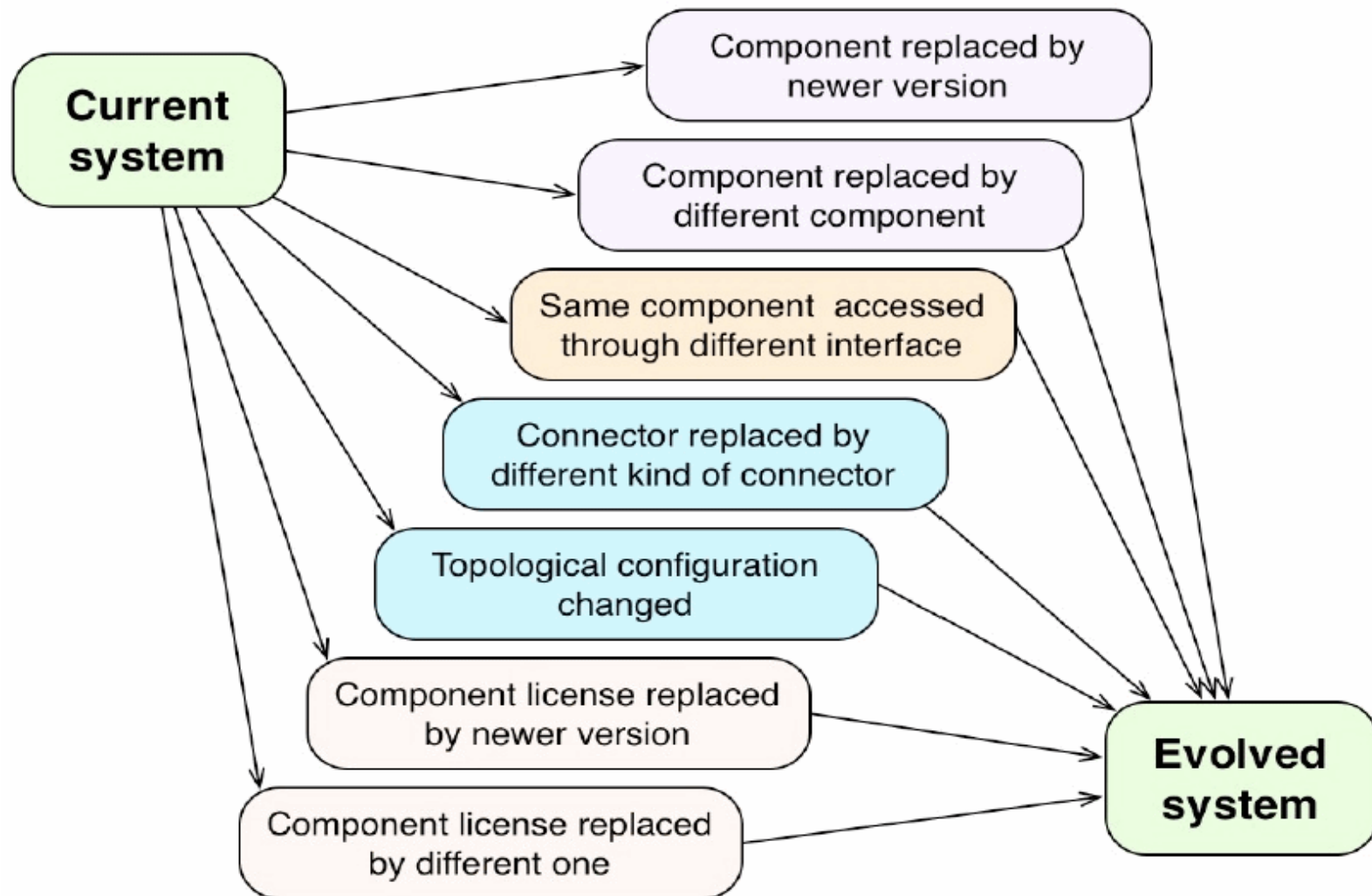
Commercial Mobile Apps also being used (enterprise middleware services, not shown)



Enterprise-to-Mobile Middleware *IP Licenses* (for the NitroDesk *Touchdown* product)

- * LGPL 2.1
- * Ical4j from Ben Fortuna
- * Public Domain Declaration
- * Apache 2
- * The Legion of the Bouncy Castle
- * Creative Commons BY
- * Sony Mobile
- * Jesse Anderson
- * OpenSSL
- * Apple Non-Exclusive
- * SQLite
- * Microsoft Public License

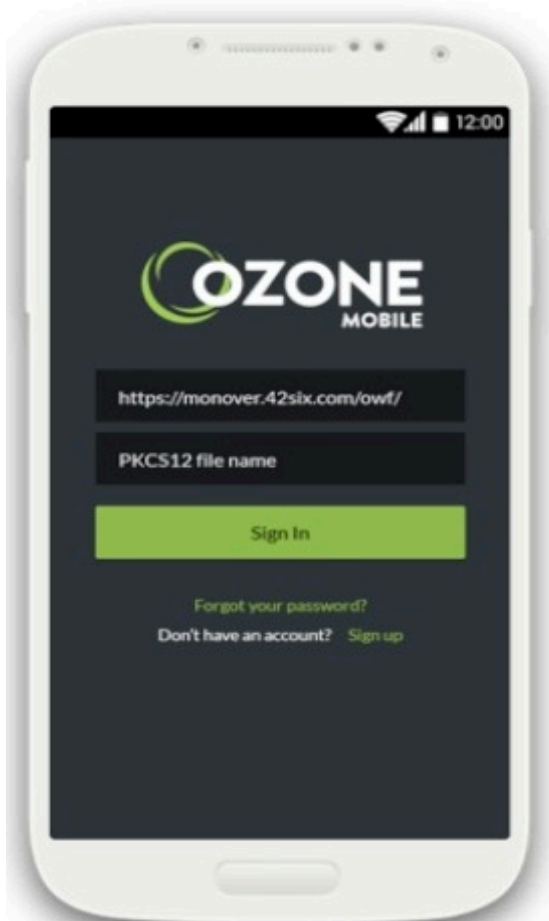
Multi-party acquisition and OA development ecosystems: *Multiple OA system evolution paths*



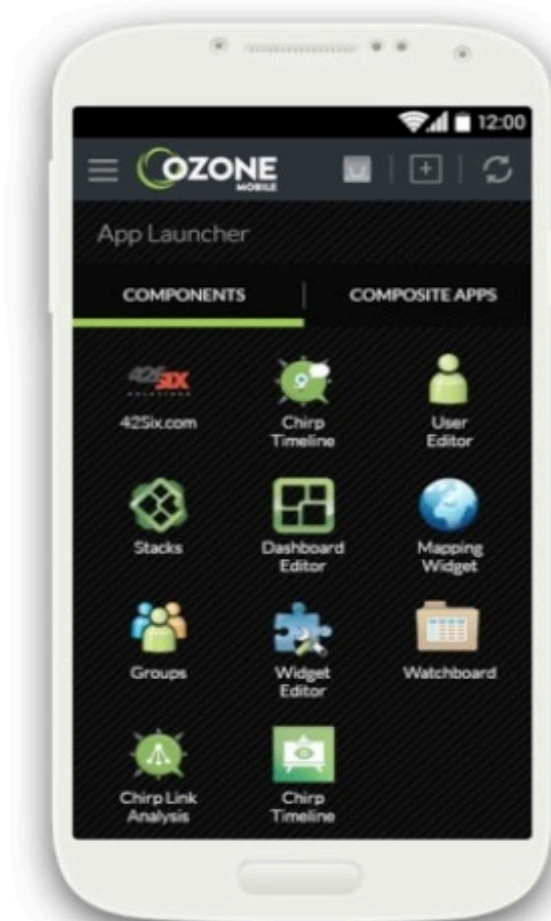
IP and cybersecurity requirements will need *continuous attention!*

Shared development of Apps and Widgets as OA system components: *Cybersecurity?*

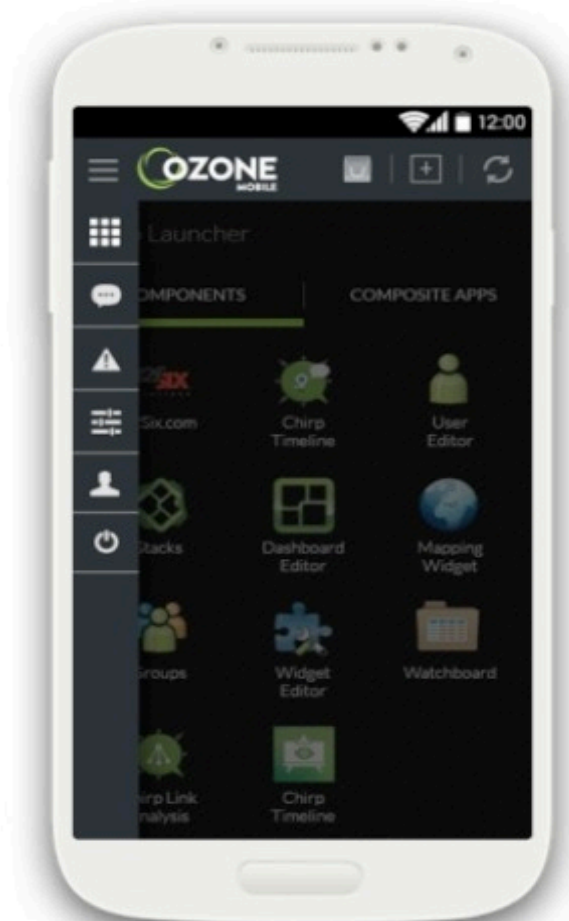
CAS Sign In



App Launcher



Ozone Mobile Drawer Menu



Ozone Widgets supporting “*Bring Your Own Devices*” (BYOD)?

Growing diversity of challenges in cybersecurity

- Scacchi, W. and Alspaugh, T. (2012) Addressing Challenges in the Acquisition of Secure Software Systems with Open Architectures, *Proc. 9th Acquisition Research Symposium*, Vol. 1, 165-184, Naval Postgraduate School, Monterey, CA.
- Scacchi, W. and Alspaugh, T. (2013a). Processes in Securing Open Architecture Software Systems, *Proc. 2013 Intern. Conf. Software and System Processes*, San Francisco, CA, May 2013.
- Scacchi, W. and Alspaugh, T.A. (2013b). Streamlining the Process of Acquiring Secure Open Architecture Software Systems, *Proc. 10th Annual Acquisition Research Symposium*, Monterey, CA, 608-623, May 2013.
- Scacchi, W. and Alspaugh, T.A. (2013c). Challenges in the Development and Evolution of Secure Open Architecture Command and Control Systems, *Proc. 18th Intern. Command and Control Research and Technology Symposium*, Paper-098, Alexandria, VA, June 2013.

New business models for acquisition of OA Web/mobile software components

- Franchising
- Enterprise licensing
- Metered usage
- Advertising supported
- Subscription
- Free component, paid service fees
- Federated reciprocity for shared development
- Collaborative buying
- Donation
- Sponsorship
- (Government) open source software
- and others

Emerging challenges in achieving BBP via OA Web/mobile software systems

- Acquisition program managers/staff *may not understand* how software IP licenses affect OA system design, and vice-versa.
- Software IP and cybersecurity obligations and rights propagate across system development, deployment, and evolution activities *in ways not well understood* by system developers, integrators, end-users, or acquisition managers.

Emerging challenges in achieving BBP via OA Web/mobile software systems

- *Failure to understand* software IP and cybersecurity obligations and rights propagation can reduce DoD buying power, increase software life cycle costs, and reduce competition.
- DoD and other Government agencies *would financially and administratively benefit* from engaging the development and deployment of an (open source) automated *software obligations and rights management system* (SORMS) for the acquisition workforce.

New practices to realize cost-effective acquisition of OA software systems

- Need to R&D ***worked examples*** of reference OA system models, assembled capabilities, and component evolution alternatives.
- Need ***open source models of*** app/widget security assurance ***processes and*** reusable cybersecurity ***requirements.***

New practices to realize cost-effective acquisition of OA software systems

- Need precise ***domain-specific languages*** (DSLs) and ***automated analysis tools*** for continuously assessing and continuously improving cybersecurity and IP requirements for OA C2 systems composed from apps/widgets.
 - Need a *software obligations and rights management system* (SORMS) to streamline Web/mobile software component acquisition

Conclusions

- Our research identifies how new Web/mobile software component technologies, IP and security requirements, and new business models interact to *drive-down or drive-up* acquisition costs.
- Managing acquisition costs for OA Web/mobile software components will be demanding.
- Acquisition workforce will need automated assistance, *else acquisition process costs will dominate development costs* for OA Web/mobile software components!

Conclusions

- New technical risks for component-based OA software systems can dilute the cost-effectiveness of BBP efforts.
- Need R&D leading to automated systems (SORMS) that can model and analyze OA system IP licenses and cybersecurity requirements
 - SORMS will empower the acquisition workforce, and
 - Identify and manage cost-effectiveness trade-offs

Acknowledgements

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