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

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INSTITUTE *for* **SOFTWARE RESEARCH**
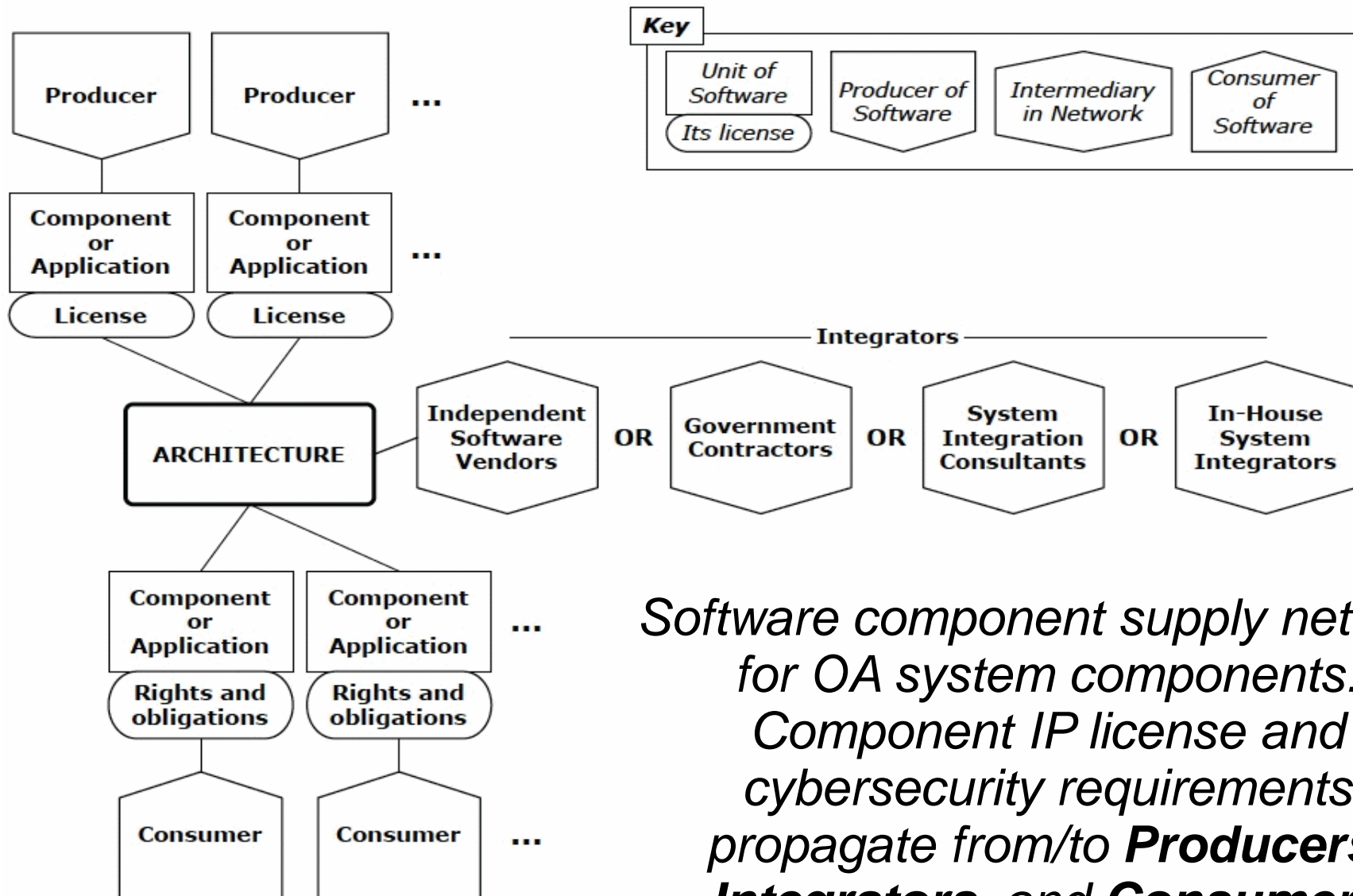UNIVERSITY *of* CALIFORNIA · IRVINE

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

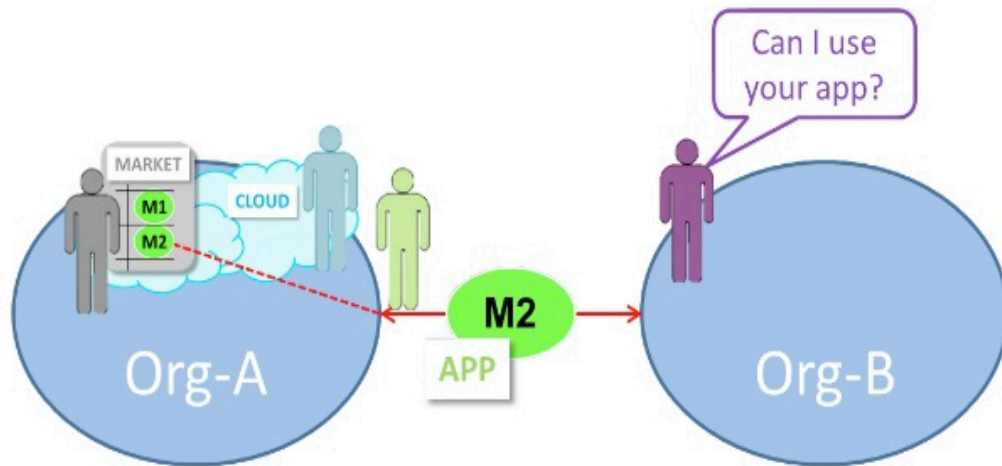- New business models for OA software component development and use

Multi-party acquisition and OA development ecosystems

Key

| Unit of Software / Its license | Producer of Software | Intermediary in Network | Consumer of Software |

Integrators: Independent Software Vendors OR Government Contractors OR System Integration Consultants OR In-House System Integrators
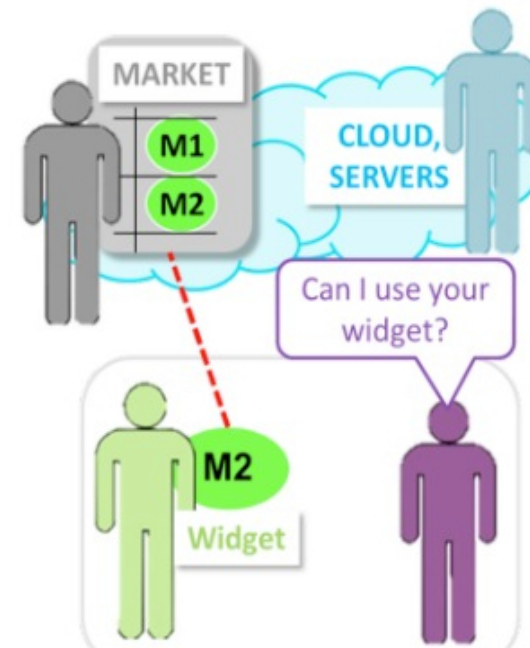
*Software component supply network for OA system components: Component IP license and cybersecurity requirements propagate from/to **Producers, Integrators,** and **Consumers***

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

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

Widget Framework for Web-based PCs

Shared development of Mobile Apps and Widgets as OA system components

Ozone Widget Framework for Mobile Devices

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

Widgets available within *App Store*

Commercial Mobile Apps also being used
(enterprise middleware services, not shown)
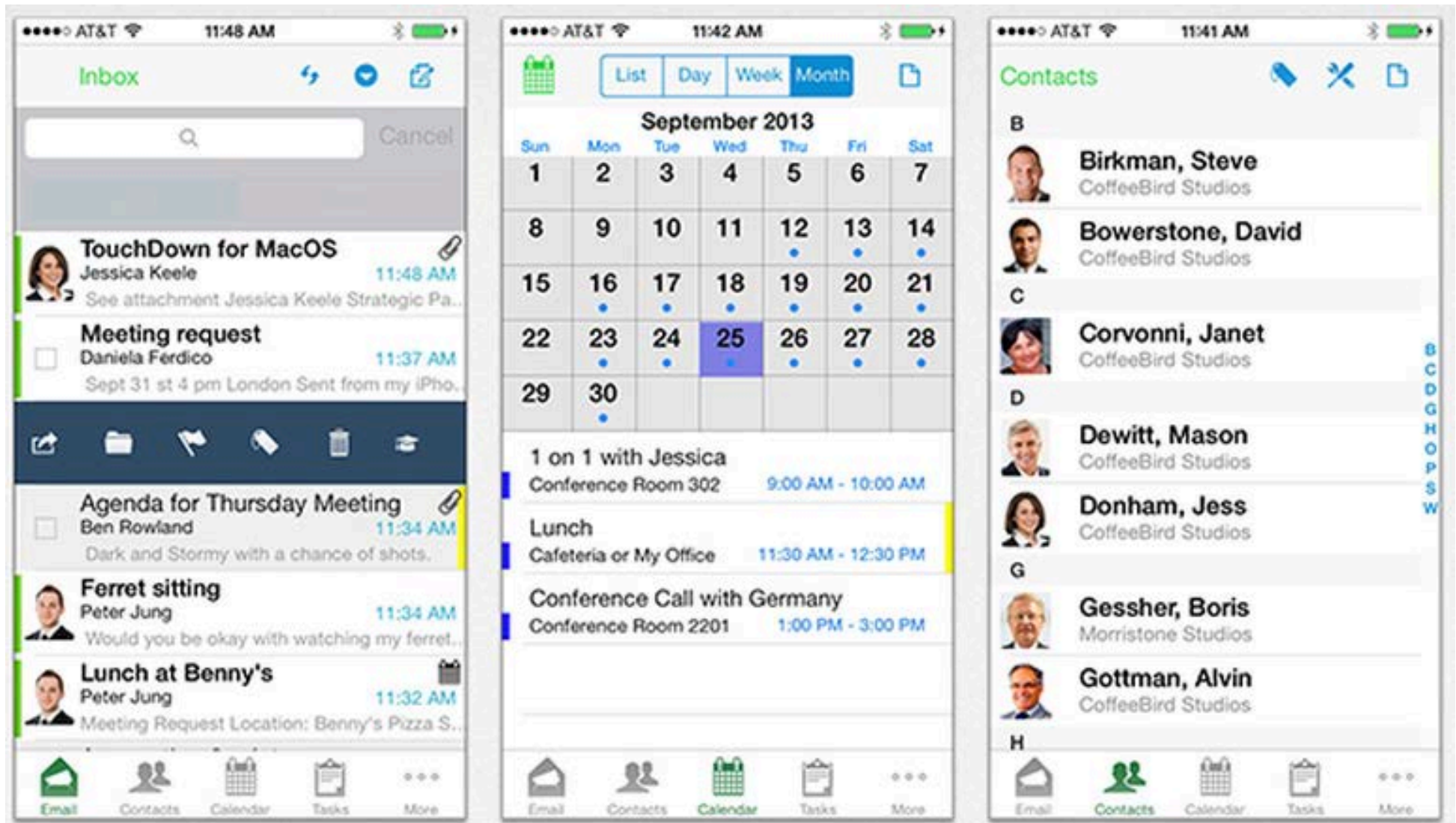
Enterprise-to-Mobile Middleware *IP Licenses*
(for the NitroDesk *Touchdown* product)

* 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*
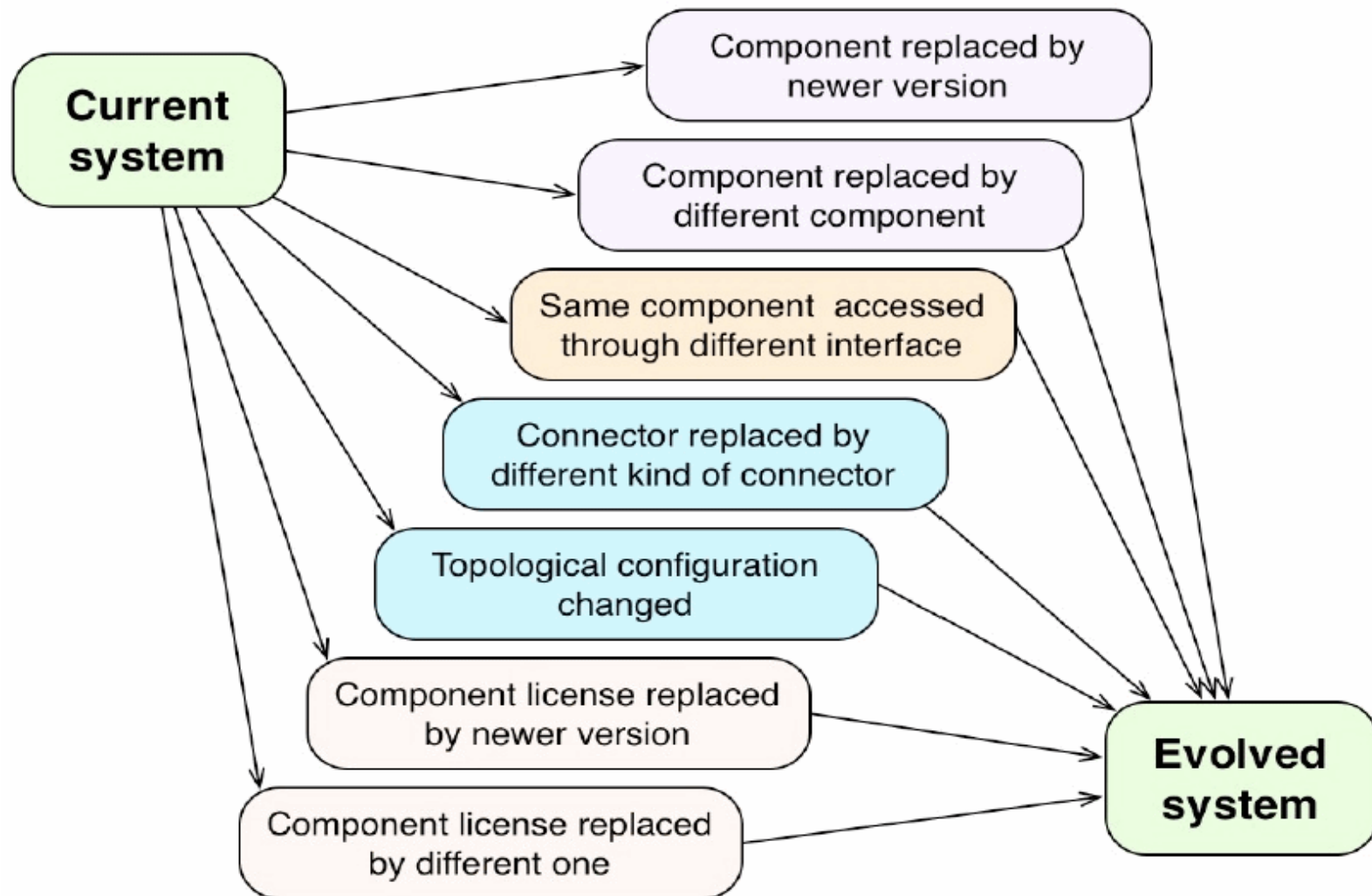
IP and cybersecurity requirements will need *continuous attention!*

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

CAS Sign In
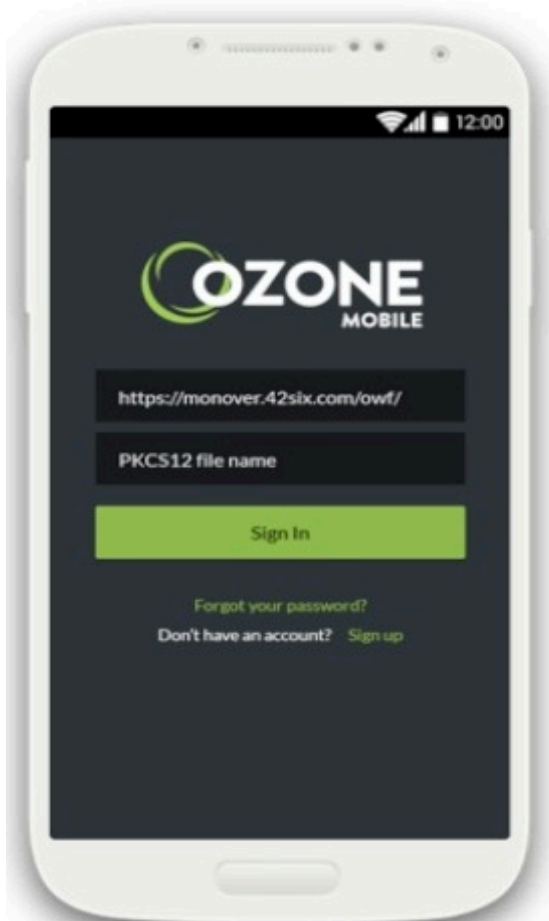
App Launcher
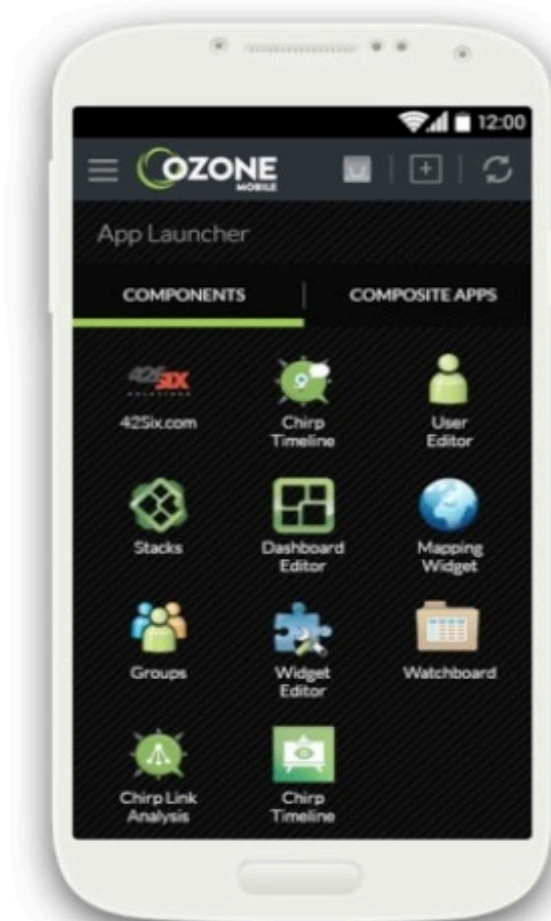
Ozone Mobile Drawer Menu
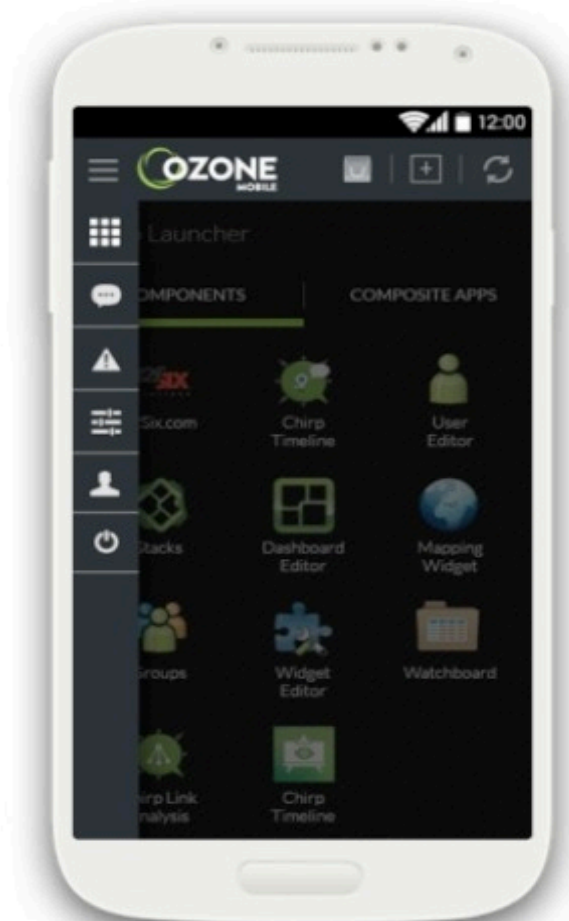
Ozone Widgets supporting *"Bring Your Own Devices"* (BYOD)?

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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