

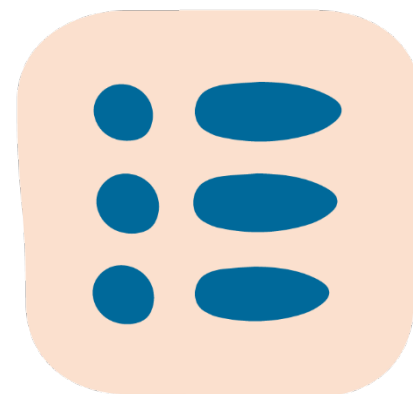
ThoughtWorks®

www.thoughtworks.com

敏捷测试中的视觉验证探索

付彪

- 我们的团队
- 一些痛点和挑战
- 解决方案—视觉验证
- 自动化实现
- 实践和价值



我们的团队

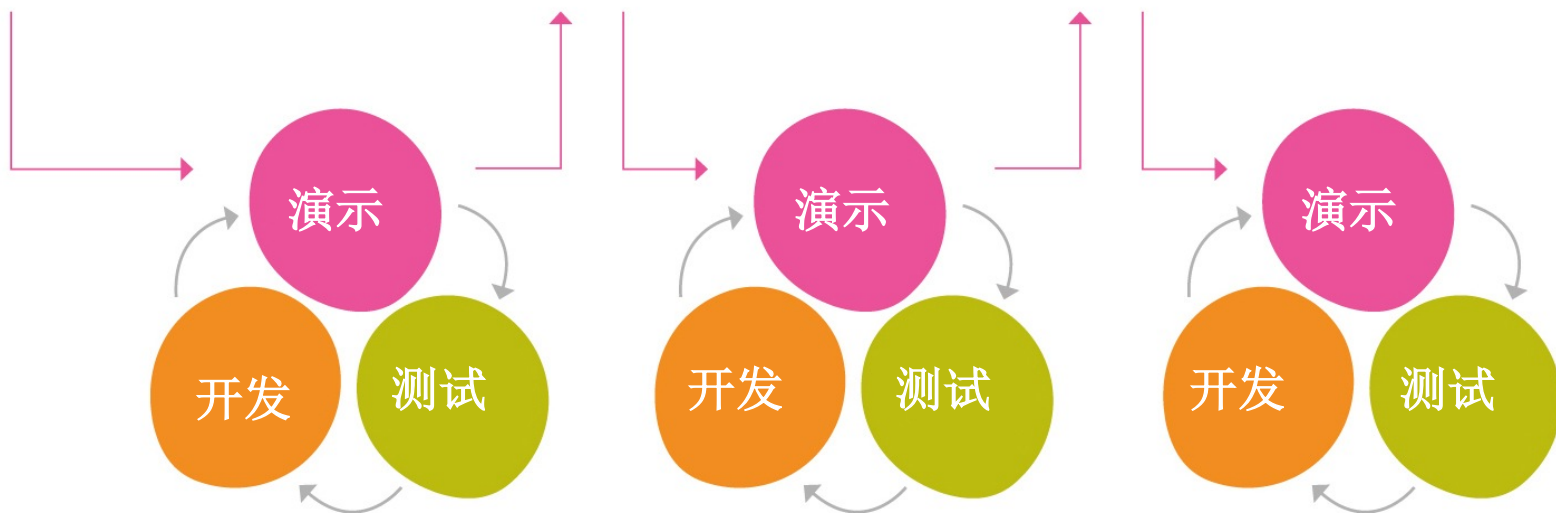


我们的团队

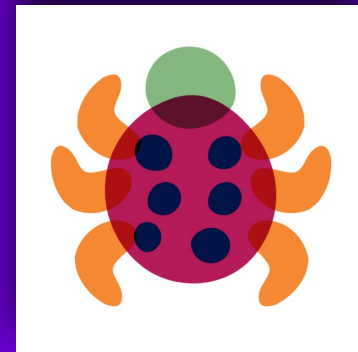


项目启动

设计 — 开发 — 测试 — 发布



一些痛点和挑战



一些痛点 — Icon

 glyphicon glyphicon- folder-open	 glyphicon glyphicon- resize-vertical	 glyphicon glyphicon- resize- horizontal	 glyphicon glyphicon-hdd	 glyphicon glyphicon- bullhorn	 glyphicon glyphicon-bell	 glyphicon glyphicon- certificate	 glyphicon glyphicon- thumbs-up
 glyphicon glyphicon- thumbs-down	 glyphicon glyphicon- hand-right	 glyphicon glyphicon- hand-left	 glyphicon glyphicon- hand-up	 glyphicon glyphicon- hand-down	 glyphicon glyphicon- circle-arrow- right	 glyphicon glyphicon- circle-arrow- left	 glyphicon glyphicon- circle-arrow-up
 glyphicon glyphicon- circle-arrow- down	 glyphicon glyphicon- globe	 glyphicon glyphicon- wrench	 glyphicon glyphicon- tasks	 glyphicon glyphicon-filter	 glyphicon glyphicon- briefcase	 glyphicon glyphicon- fullscreen	 glyphicon glyphicon- dashboard
 glyphicon glyphicon- paperclip	 glyphicon glyphicon- heart-empty	 glyphicon glyphicon-link	 glyphicon glyphicon- phone	 glyphicon glyphicon- pushpin	 glyphicon glyphicon-usd	 glyphicon glyphicon-gbp	 glyphicon glyphicon-sort
 glyphicon glyphicon-sort- by-alphabet	 glyphicon glyphicon-sort- by-alphabet-alt	 glyphicon glyphicon-sort- by-order	 glyphicon glyphicon-sort- by-order-alt	 glyphicon glyphicon-sort- by-attributes	 glyphicon glyphicon-sort- by-attributes- alt	 glyphicon glyphicon- unchecked	 glyphicon glyphicon- expand

一些痛点 — Image



活动报名信息确认表

活动时间
2016年10月30日 18:00-20:00

活动地点
锦业路绿地领海B座23楼

活动地址
中国陕西省西安市雁塔区锦业路

活动安排
18:00-18:30
签到
18:30-20:00
活动

活动报名信息确认表



蛋糕网上预定

网上订单

选择你钟意的蛋糕

秋栗慕斯
秋栗慕斯 法国铁塔淡奶油、法国顶级法芙娜巧克力、法国白兰地酒、法国黑糖、韩国动砂糖、鲜柠檬

小K甜心
法国铁塔淡奶油、法国宝蕾芒果泥、法国铁塔乳脂

请先选择蛋糕规格

蛋糕规格：
1.5磅 约18*18 (cm)
2.0磅 约20*20 (cm)
3.0磅 约23*23 (cm)

蛋糕网上预定



问卷调查

净水器 市场问卷调查

您好！衷心感谢的参与我们的问卷调查，此次调查旨在了解您对“家用净水器”的认识与感知情况，并以此分析净水器市场概况，为我们进一步研究提供重要的参考数据。为获得真实结论，恳请您客观填写。

1、您认为水对人体重要吗？（人体质量的70%是由水组成的）*

☐ 非常重要
☐ 重要
☐ 一般

2、您家中是否存在水垢现象？*

☐ 有，水壶水垢较明显
☐ 有，有时龙头出黄色脏水
☐ 无，对净化水质非常信任

3、您对家中的自来水产生过哪些质疑？*

净水器 市场问卷调查



咨询登记表

信息登记

客户姓名
姓名

性别
☐ 先生 ☐ 女士

联系电话
电话

来源渠道
☐ 电视
☐ 微信
☐ 微博
☐ 其他

咨询的事宜

咨询登记表



商品订单

在线订单

高福水果

蓝莓（盒）
智利进口蓝莓空运到京，颗颗饱满，色泽深蓝，果肉紧实，可食营养丰富，其中富含大量花青素等有益于人体的营养物质，对缓解眼部疲劳有显著功效。一盒125克。

芒果（斤）
肉厚核小，果肉厚实，口味香甜。

¥30.00
库存 9999

¥40.00
库存 9999

商品订单



代理申请

代理申请表

代理申请表

姓名*

手机*

职业*

微信号*

性别*

☐ 男

代理申请表



会议室预订

会议室预订

姓名*

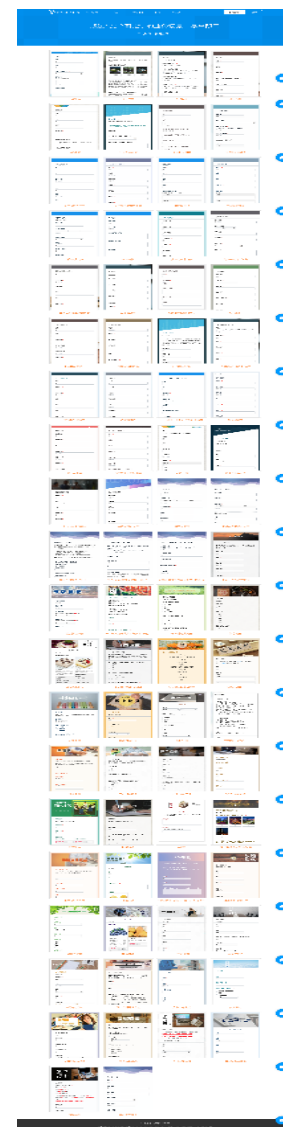
部门
请选择

预约日期（请选择不早于2016-09-20的日期）
年 月 日

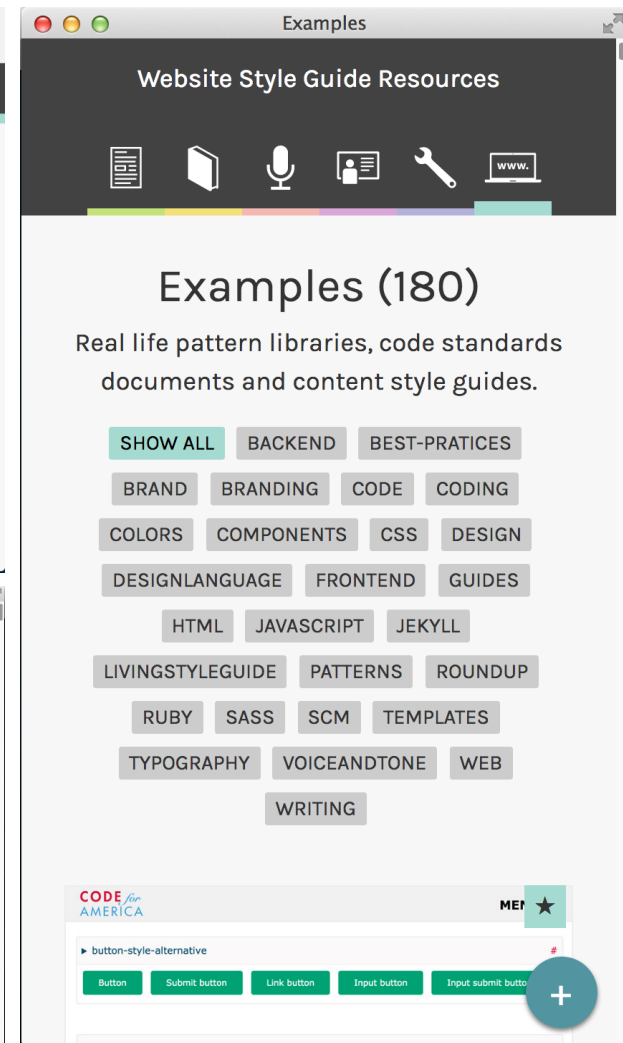
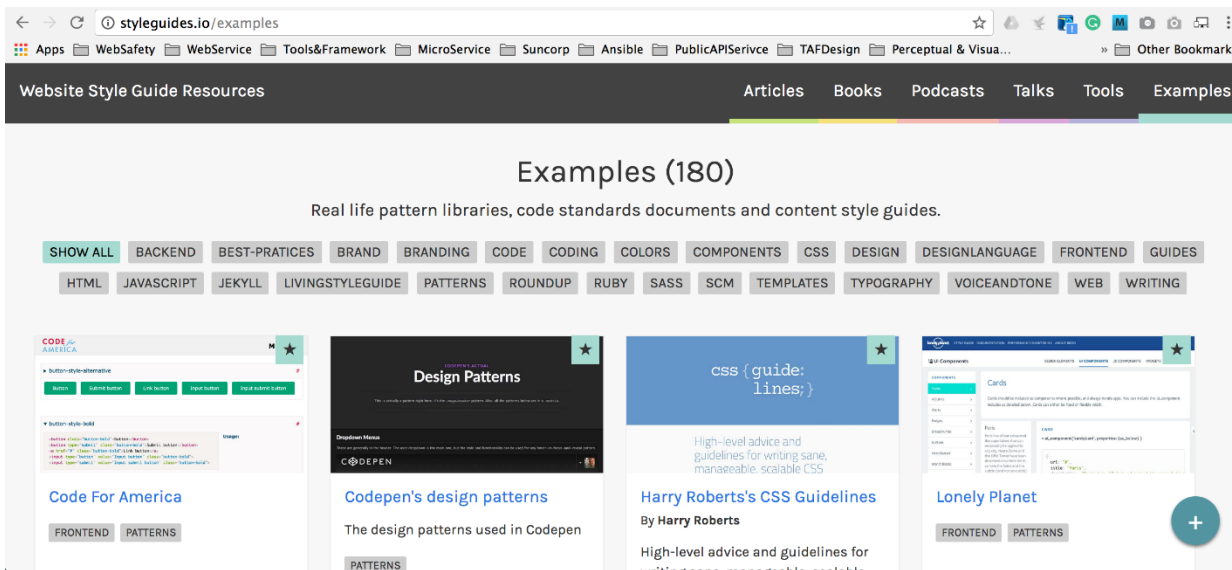
开始时间
时 分

结束时间
时 分

会议室预订



一些挑战 — Responsive



COMPONENTS

Cards >

Ad Units >

Alerts >

Badges >

Breadcrumbs >

Buttons >

Hero Banner >

Month blocks >

Preloader >

Page Title >

Pagination >

Picture >

POI List >

Buttons

Please note:

Buttons do not call this component directly as the abstraction would be overkill. Buttons should always look like these through a combination of the modifier classes detailed below and in [buttons.sass](#)

Colour variations

Standard button

Lonely

```
<a class='btn btn--linkblue btn--medium'
```

Green button

Register

```
<a class='btn btn--green btn--medium' href=
```

Red button

Delete

```
<a class='btn btn--medium btn--red' href=
```

Yellow button

Book

```
<a class='btn btn--medium btn--yella' href=
```

解决方案



See How We Can Help You



Auto Insurance With Superior Service

Discover how well we can take care of you today. Members who switched saved an average of \$376 a year.¹

[Get a Free Quote](#) [Learn More](#)



Personalized Home and Renters Insurance

Get replacement cost coverage with competitive homeowners or renters insurance.³

[Homeowners](#) [Renters](#)

Plus, we offer a complete suite of exclusive products, services, tools and advice.

[View All](#)

See How We Can Help Today



Auto Insurance With Superior Service

Discover how well we can take care of you today. Members who switched saved an average of \$376 a year.¹

[Get a Free Quote](#) [Learn More](#)



Personalized Home and Renters Insurance

Get replacement cost coverage with competitive homeowners or renters insurance.³

[Homeowners](#) [Renters](#)

Plus, we offer a complete suite of exclusive products, services, tools and advice.

[View All](#)



Free Checking

Bank from anywhere with our award-winning mobile app. Plus, learn how payday can come a day early.²

[Get Started](#) [Learn More](#)



Competitive Credit Card Rates

Explore competitive variable credit card rates with great rewards programs.

[Find the Right Card for You](#)



Free Checking

Bank from anywhere with our award-winning mobile app. Plus, learn how payday can come a day early.²

[Get Started](#) [Learn More](#)



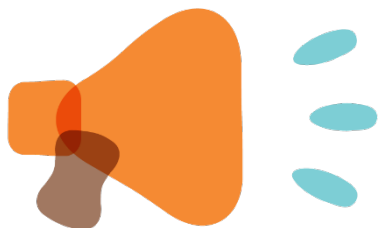
Competitive Credit Card Rates

Explore competitive variable credit card rates with great rewards programs.

[Find the Right Card for You](#)

Plus, we offer a complete suite of exclusive products, services, tools and advice.

[View All](#)

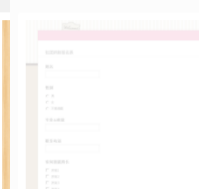
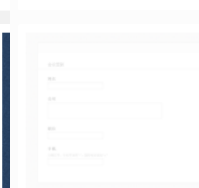


视觉验证是一种质量保证(QA)方式，通过获取和对比应用的图形界面来保证产品在设计 and 实现上的正确性。

- 准确的识别Icon & Image
- 高效的验证Responsive
- 自动化测试Style Guide & AEM的产品
- 弥补Selenium的测试盲点
- 增强对产品的信心



视觉验证 — 识别Icon & Image

 教学测试	 投诉平台	 教学测试	 投诉平台	 学霸报名	 学生签到	 学霸报名	 学生签到
 爆料投稿	 XXX 幼儿园电子学籍信息采集表	 爆料投稿	 XXX 幼儿园电子学籍信息采集表	 大学生业余时间调查	 海外实习调查问卷	 大学生业余时间调查	 海外实习调查问卷
 社团纳新报名表	 试听预约	 社团纳新报名表	 试听预约	 在线考试	 班级通讯录	 在线考试	 班级通讯录
 员工综合考核	 培训班签到反馈	 员工综合考核	 培训班签到反馈	 教师资格证考试题库	 优秀教师评选	 教师资格证考试题库	 优秀教师评选
 会议签到	 成绩查询系统	 会议签到	 成绩查询系统	 校园活动报名	 亲子活动报名表	 校园活动报名	 亲子活动报名表

视觉验证 — 识别Icon & Image

 glyphicon glyphicon-asterisk	 glyphicon glyphicon-plus	 glyphicon glyphicon-euro	 glyphicon glyphicon-eur	 glyphicon glyphicon-minus	 glyphicon glyphicon-asterisk	 glyphicon glyphicon-plus	 glyphicon glyphicon-euro	 glyphicon glyphicon-eur	 glyphicon glyphicon-minus	 glyphicon glyphicon-cloud	 glyphicon glyphicon-envelope	 glyphicon glyphicon-pencil	 glyphicon glyphicon-minus	 glyphicon glyphicon-cloud	 glyphicon glyphicon-envelope	 glyphicon glyphicon-pencil
 glyphicon glyphicon-glasses	 glyphicon glyphicon-music	 glyphicon glyphicon-search	 glyphicon glyphicon-heart	 glyphicon glyphicon-star	 glyphicon glyphicon-glasses	 glyphicon glyphicon-music	 glyphicon glyphicon-search	 glyphicon glyphicon-heart	 glyphicon glyphicon-star	 glyphicon glyphicon-star-empty	 glyphicon glyphicon-user	 glyphicon glyphicon-film	 glyphicon glyphicon-star	 glyphicon glyphicon-star-empty	 glyphicon glyphicon-user	 glyphicon glyphicon-film
 glyphicon glyphicon-th-large	 glyphicon glyphicon-th	 glyphicon glyphicon-th-list	 glyphicon glyphicon-ok	 glyphicon glyphicon-remove	 glyphicon glyphicon-th-large	 glyphicon glyphicon-th	 glyphicon glyphicon-th-list	 glyphicon glyphicon-ok	 glyphicon glyphicon-remove	 glyphicon glyphicon-zoom-in	 glyphicon glyphicon-zoom-out	 glyphicon glyphicon-off	 glyphicon glyphicon-remove	 glyphicon glyphicon-zoom-in	 glyphicon glyphicon-zoom-out	 glyphicon glyphicon-off
 glyphicon glyphicon-signal	 glyphicon glyphicon-cog	 glyphicon glyphicon-trash	 glyphicon glyphicon-home	 glyphicon glyphicon-file	 glyphicon glyphicon-signal	 glyphicon glyphicon-cog	 glyphicon glyphicon-trash	 glyphicon glyphicon-home	 glyphicon glyphicon-file	 glyphicon glyphicon-time	 glyphicon glyphicon-road	 glyphicon glyphicon-download-alt	 glyphicon glyphicon-file	 glyphicon glyphicon-time	 glyphicon glyphicon-road	 glyphicon glyphicon-download-alt
 glyphicon glyphicon-download	 glyphicon glyphicon-upload	 glyphicon glyphicon-inbox	 glyphicon glyphicon-play-circle	 glyphicon glyphicon-repeat	 glyphicon glyphicon-download	 glyphicon glyphicon-upload	 glyphicon glyphicon-inbox	 glyphicon glyphicon-play-circle	 glyphicon glyphicon-repeat	 glyphicon glyphicon-refresh	 glyphicon glyphicon-list-alt	 glyphicon glyphicon-lock	 glyphicon glyphicon-repeat	 glyphicon glyphicon-refresh	 glyphicon glyphicon-list-alt	 glyphicon glyphicon-lock
 glyphicon glyphicon-flag	 glyphicon glyphicon-headphones	 glyphicon glyphicon-volume-off	 glyphicon glyphicon-volume-down	 glyphicon glyphicon-volume-up	 glyphicon glyphicon-flag	 glyphicon glyphicon-headphones	 glyphicon glyphicon-volume-off	 glyphicon glyphicon-volume-down	 glyphicon glyphicon-volume-up	 glyphicon glyphicon-qrcode	 glyphicon glyphicon-barcode	 glyphicon glyphicon-tag	 glyphicon glyphicon-volume-up	 glyphicon glyphicon-qrcode	 glyphicon glyphicon-barcode	 glyphicon glyphicon-tag
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 glyphicon glyphicon-indent-right	 glyphicon glyphicon-facetime-video	 glyphicon glyphicon-picture	 glyphicon glyphicon-map-marker	 glyphicon glyphicon-adjust	 glyphicon glyphicon-indent-right	 glyphicon glyphicon-facetime-video	 glyphicon glyphicon-picture	 glyphicon glyphicon-map-marker	 glyphicon glyphicon-adjust	 glyphicon glyphicon-tint	 glyphicon glyphicon-edit	 glyphicon glyphicon-share	 glyphicon glyphicon-adjust	 glyphicon glyphicon-tint	 glyphicon glyphicon-edit	 glyphicon glyphicon-share
 glyphicon glyphicon-check	 glyphicon glyphicon-move	 glyphicon glyphicon-step-backward	 glyphicon glyphicon-fast-backward	 glyphicon glyphicon-backward	 glyphicon glyphicon-check	 glyphicon glyphicon-move	 glyphicon glyphicon-step-backward	 glyphicon glyphicon-fast-backward	 glyphicon glyphicon-backward	 glyphicon glyphicon-play	 glyphicon glyphicon-pause	 glyphicon glyphicon-stop	 glyphicon glyphicon-backward	 glyphicon glyphicon-play	 glyphicon glyphicon-pause	 glyphicon glyphicon-stop
 glyphicon glyphicon-forward	 glyphicon glyphicon-fast-forward	 glyphicon glyphicon-step-forward	 glyphicon glyphicon-eject	 glyphicon glyphicon-chevron-left	 glyphicon glyphicon-forward	 glyphicon glyphicon-fast-forward	 glyphicon glyphicon-step-forward	 glyphicon glyphicon-eject	 glyphicon glyphicon-chevron-left	 glyphicon glyphicon-chevron-right	 glyphicon glyphicon-plus-sign	 glyphicon glyphicon-minus-sign	 glyphicon glyphicon-chevron-left	 glyphicon glyphicon-chevron-right	 glyphicon glyphicon-plus-sign	 glyphicon glyphicon-minus-sign

视觉验证 — 验证Responsive

Build your own home insurance with AXA

When you get a quote with us, we'll offer you the choice of three levels of cover that you can customise to suit your needs.

[Get a quote >](#)

[Retrieve a quote](#)

Build your own home insurance with AXA

When you get a quote with us, we'll offer you the choice of three levels of cover that you can customise to suit your needs.

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[Retrieve a quote](#)

[Retrieve a quote](#)

Insurance

the choice

se to suit

Why choose AXA



Brand new replacements if contents are damaged or stolen.



Up to £1,000 emergency cash advance with contents insurance



If there's a break-in, we'll send a locksmith to replace the locks

Why choose AXA



Brand new replacements if contents are damaged or stolen.



24 hour emergency helpline



Covers flooding, fire and escape of water



Up to £1,000 emergency cash advance with contents insurance



Up to £1,000 emergency cash advance with contents insurance



Covers flooding, fire and escape of water



If there's a break-in, we'll send a locksmith to replace the locks



Repairs by our approved suppliers guaranteed



Repairs by our approved suppliers guaranteed

24 hour emergency helpline



Covers flooding, fire and escape of water

Up to £1,000 emergency cash advance with contents insurance



Repairs by our approved suppliers guaranteed

[Find out more about our policy >](#)

How we compare

	AXA
New for old replacements	✓
Add extra cover online	✓
Change home address online	✓
24/7 emergency claims line	✓

[Get a Quote >](#)

[Retrieve a quote](#)

[Find out more about our policy >](#)

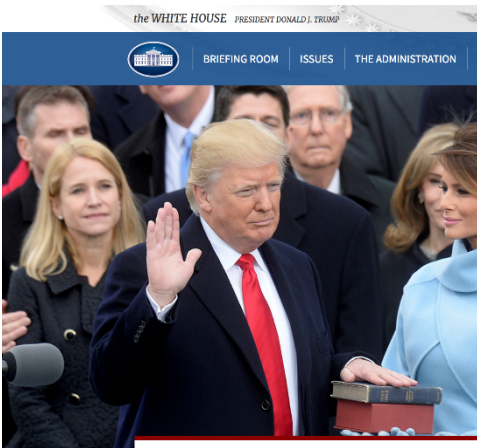
How we compare

[Find out more about our policy >](#)

	AXA	Churchill	Direct Line	More Than
New for old replacements	✓	✓	✓	✓
Add extra cover online	✓	✗	✗	✗
Change home address online	✓	✗	✗	✗
New for old replacements	✓	✓	✓	✓
24/7 emergency claims line	✓	✓	✓	✓
Add extra cover online	✓	✗	✗	✗
Change home address online	✓	✗	✗	✗
24/7 emergency claims line	✓	✓	✓	✓

	Churchill	Direct Line	More Than
New for old replacements	✓	✓	✓
Add extra cover online	✗	✗	✗
Change home address online	✗	✗	✗
24/7 emergency claims line	✓	✓	✓

视觉验证 — 弥补Selenium测试盲点



Sign Up to Rec

Email Address* Zip Code*

The Inauguration o

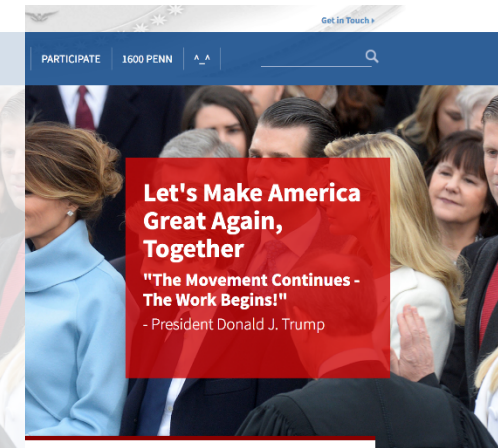
WATCH THE



HOME	ISSUES	THE ADMINISTRATION
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Latest News	America First Foreign	Vice President Mike
Video Gallery	Policy	First Lady Melania
From the Press Office	Bringing Back Jobs And	Mrs. Karen Pence
Speeches & Remarks	Growth	The Cabinet
Press Briefings	Making Our Military Strong	Special Events
Statements & Releases	Again	The 58th President
Presidential Actions	Standing Up for Our Law	inauguration
Legislation	Enforcement Community	
Nominations &	Trade Deals That Work For	
Appointments	All Americans	
Disclosures		

Sign Up to Receive Updates

The Inauguration of Donald J. Trump



Let's Make America Great Again, Together

"The Movement Continues - The Work Begins!"

- President Donald J. Trump

Receive Updates

JOIN US

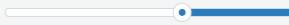
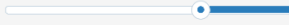
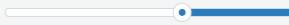
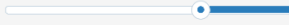
JOIN US

of Donald J. Trump

THE VIDEO

STRA	PARTICIPATE	1600 PENN
tion	Join Us	History & Grounds
ald J. Trump	Tours & Events	Presidents
et Mike Pence	Jobs with the	First Ladies
ania Trump	Administration	The Vice President's
ence	Internships	Residence & Office
	White House Fellows	Eisenhower Executive
its	Share Your Thoughts	Office Building
idental	We the People Petitions	Camp David
	Contact the White House	Air Force One
	Get Involved	Our Government
	Support SCOTUS	The Executive Branch
	Nominee Neil Gorsuch	The Legislative Branch
	Getting Americans Back to	The Judicial Branch
	Work	The Constitution
	Support Empowering	Federal Agencies &
	Female Leaders	Commissions
	President Trump Stands	Elections & Voting
	With Israel	State & Local Government

视觉验证 — 回归测试Style Guide

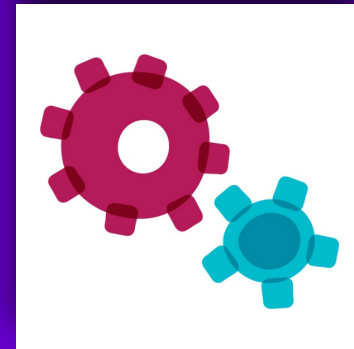
COMPONENTS Cards Ad Units Alerts Badges Breadcrumbs Buttons Hero Banner Month blocks Preloader Page Title Pagination Picture POI List POI Maps Price Label Slider Social Buttons Tiles Tags Tooltips Unsocial Buttons User Attribution NAVIGATION Dropdown Left Nav Secondary Nav FORM ELEMENTS Inputs Dropdown Range Slider <td> Range Slider This range slider is built upon <code>noUISlider</code> and is used for price and duration filtering within things to do. Without javascript it is replaced by two inputs for min/max Price slider  \$25 <pre>= ui_component('forms/range_slider', properties: { title: "Price slider", unit: "\$", unit_position: "before", min: { extreme: "0", value: "25", name: "[filters][price][lower]" }, max: { extreme: "100", value: "100", name: "[filters][price][upper]" } })</pre> Capped price slider  \$25 <pre>= ui_component('forms/range_slider', properties: { title: "Capped price slider", unit: "\$", unit_position: "before", cap_level: "90", min: { extreme: "0", value: "25", name: "[filters][price][lower]" }, max: { extreme: "100", value: "100", name: "[filters][price][upper]" } })</pre> </td>	Range Slider This range slider is built upon <code>noUISlider</code> and is used for price and duration filtering within things to do. Without javascript it is replaced by two inputs for min/max Price slider  \$25 <pre>= ui_component('forms/range_slider', properties: { title: "Price slider", unit: "\$", unit_position: "before", min: { extreme: "0", value: "25", name: "[filters][price][lower]" }, max: { extreme: "100", value: "100", name: "[filters][price][upper]" } })</pre> Capped price slider  \$25 <pre>= ui_component('forms/range_slider', properties: { title: "Capped price slider", unit: "\$", unit_position: "before", cap_level: "90", min: { extreme: "0", value: "25", name: "[filters][price][lower]" }, max: { extreme: "100", value: "100", name: "[filters][price][upper]" } })</pre>
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Duration slider

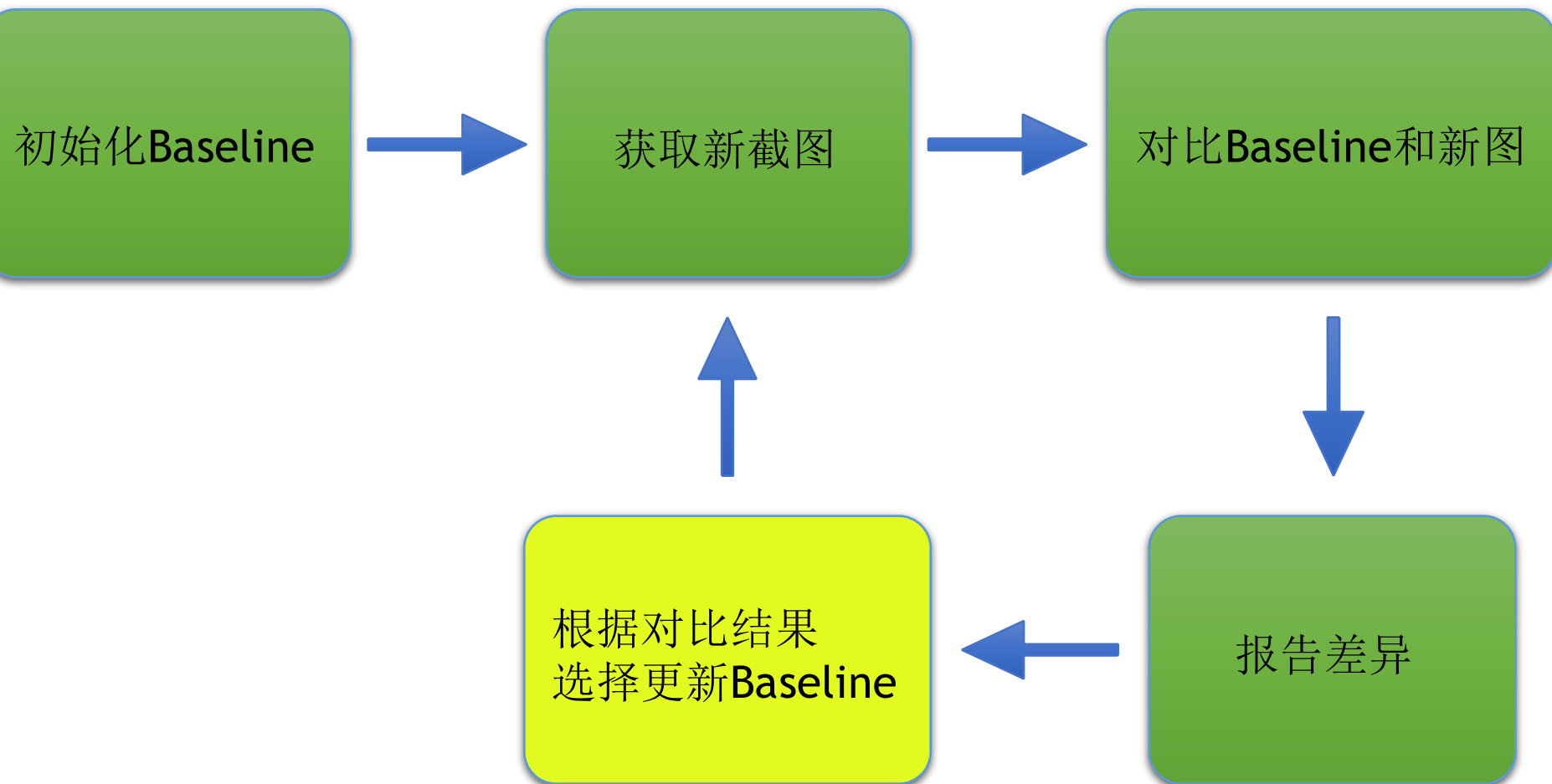


24 hours

自动化



视觉验证 — 自动化流程



视觉验证 — 自动化工具

Pix-Diff



WebdriverCSS version v1.1.10



Galen
Framework

Google
DPXDT



BackstopJS
Catch CSS curve balls.

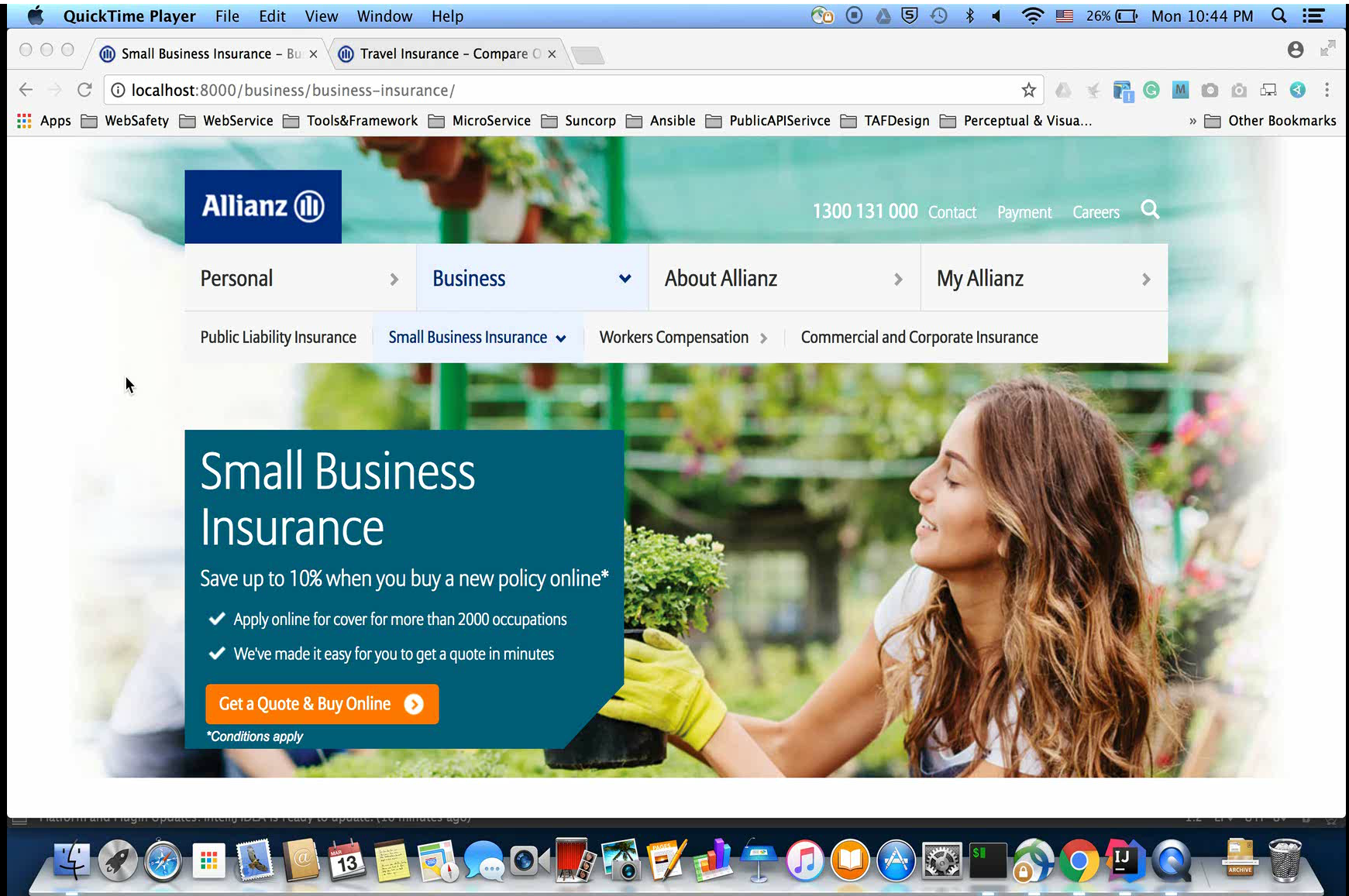
PhantomCSS

▶ DIFF.IO

- NPM & JavaScript
- 基于配置文件
- 全页面 & 单元素对比
- 使用CasperJS进行交互
- CLI & Browser 报告

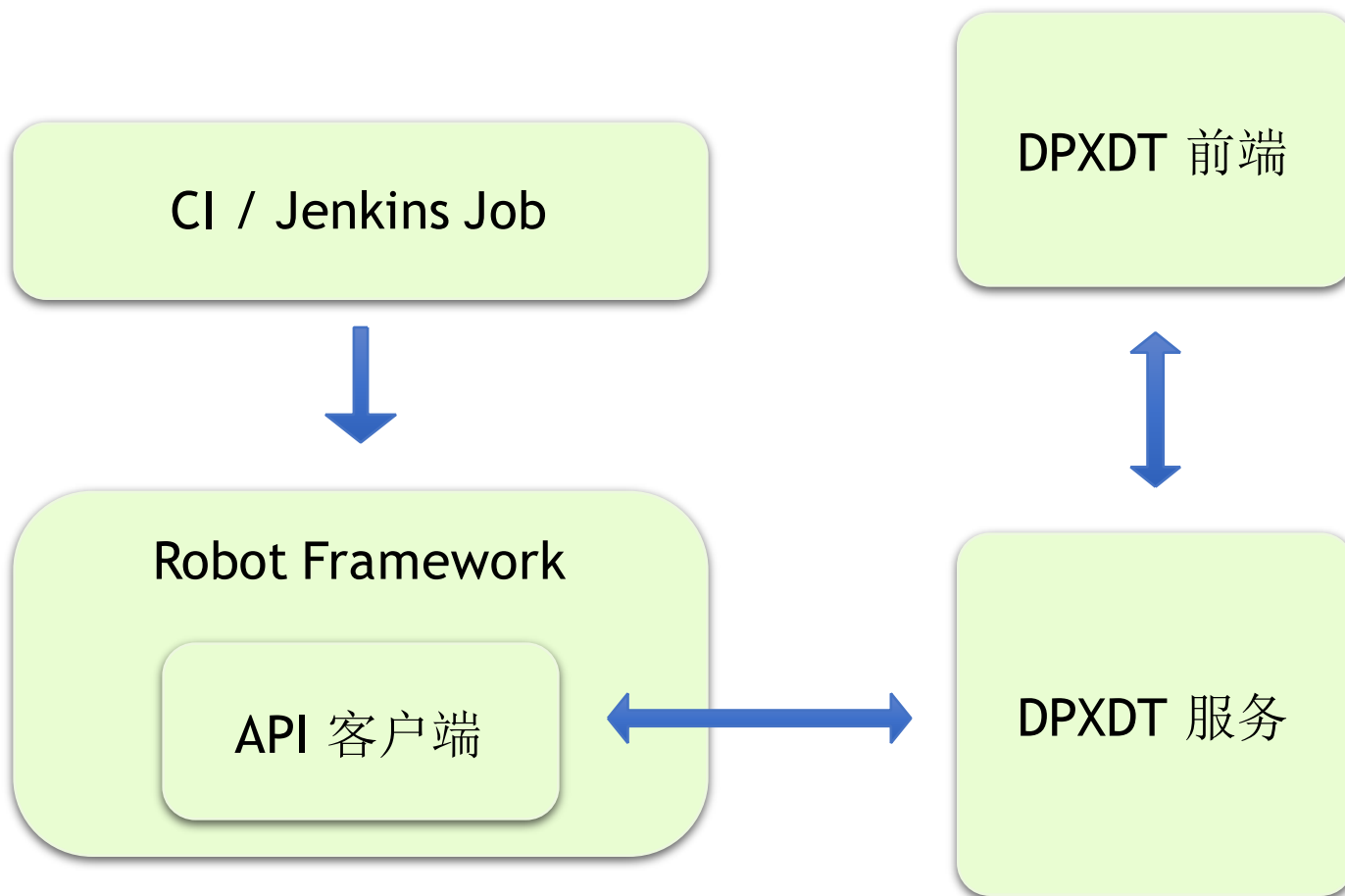


视觉验证 — BackstopJS

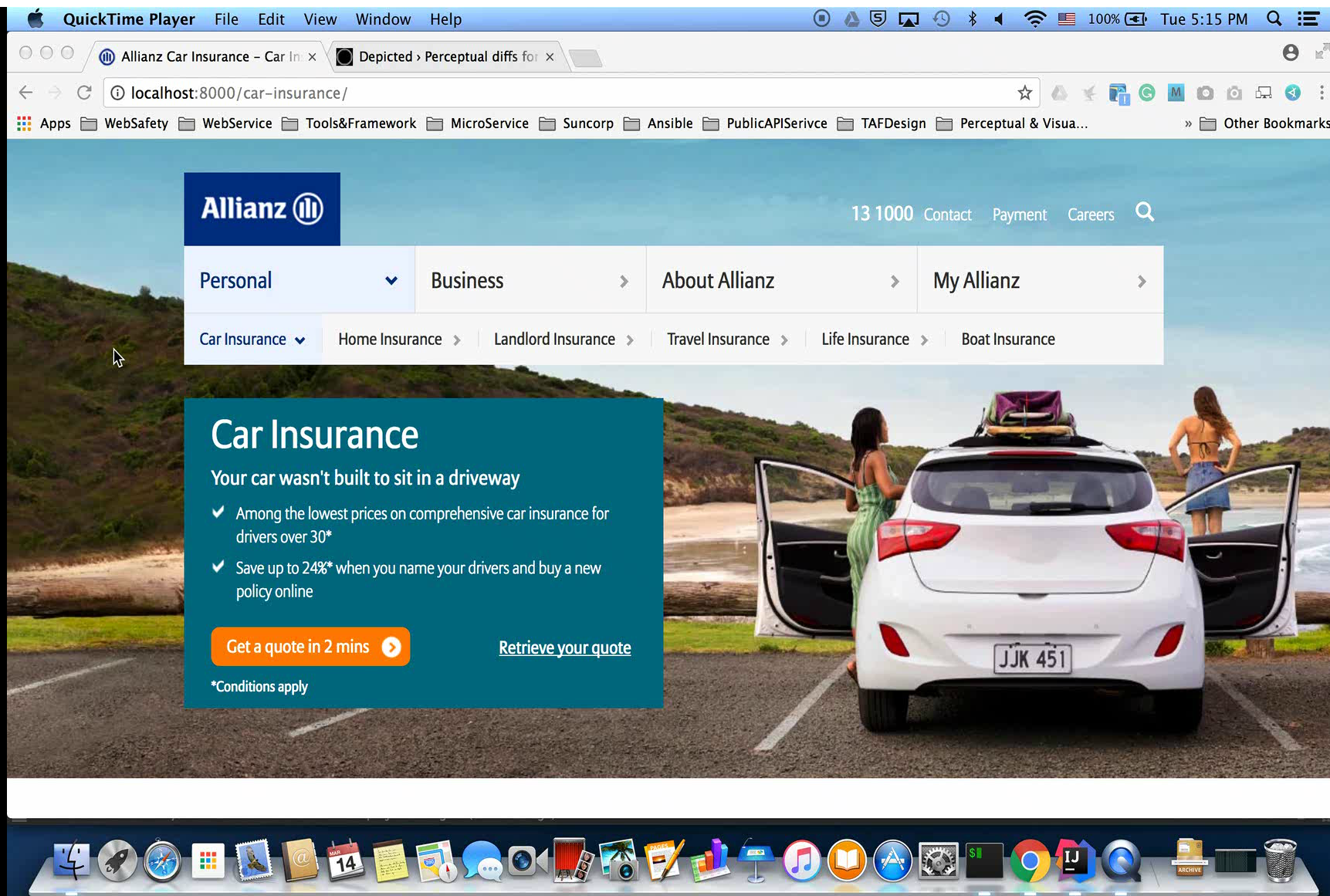


- Python
- 基于配置文件
- 命令行工具集合 (Image & URL)
- API服务
- 网页更新Baseline





视觉验证 — Dpxdt



视觉验证 — Applitools

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```
public class TestApplitoolsWebsite {  
  
    public static void main(String[] args) throws URISyntaxException, InterruptedException {  
  
        WebDriver driver = new FirefoxDriver();  
  
        Eyes eyes = new Eyes();  
        // This is your api key, make sure you use it in all your tests.  
        eyes.setApiKey("YOUR_API_KEY");  
  
        try {  
            // Start visual testing with browser viewport set to 1024x768.  
            // Make sure to use the returned driver from this point on.  
            driver = eyes.open(driver, "Applitools", "Test Web Page", new RectangleSize(1024, 768));  
  
            driver.get("http://applitools.com");  
  
            // Visual validation point #1  
            eyes.checkWindow("Main Page");  
  
            driver.findElement(By.cssSelector(".features>a")).click();  
  
            // Visual validation point #2  
            eyes.checkWindow("Features page");  
  
            // End visual testing. Validate visual correctness.  
            eyes.close();  
        } finally {  
            // Abort test in case of an unexpected error.  
            eyes.abortIfNotClosed();  
            driver.close();  
        }  
    }  
}
```

STEPS

Filter

☐

Baidu TieBa

2/7/2017 at 5:15 PM

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2/7/2017 at 5:08 PM

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Github demo test

10/27/2016 at 2:18 PM

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Github demo test

10/27/2016 at 2:18 PM

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Baidu TieBa

2/7/2017 at 5:15 PM

1 test total, 1 test failed, 1 environment, 1 viewport size, 1 mismatch

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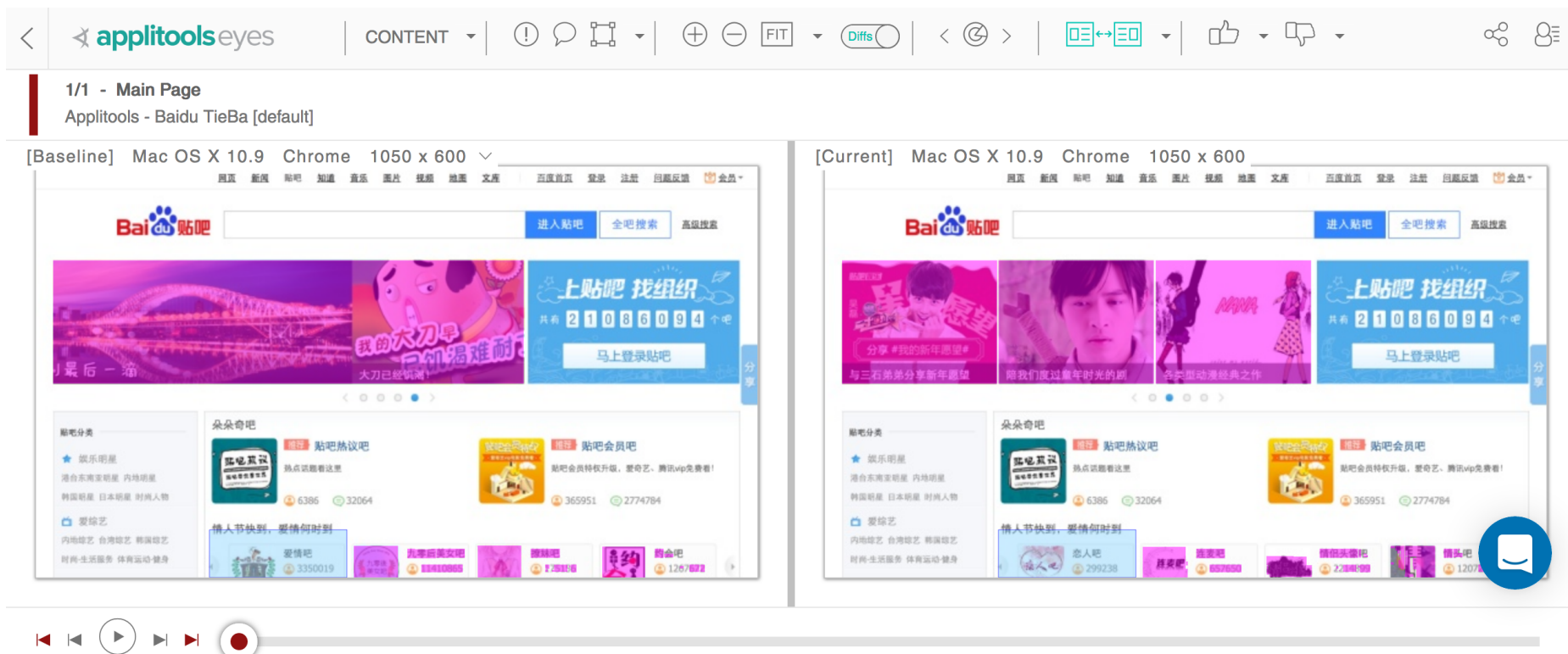
Baidu TieBa

2/7/2017 at 5:15 PM

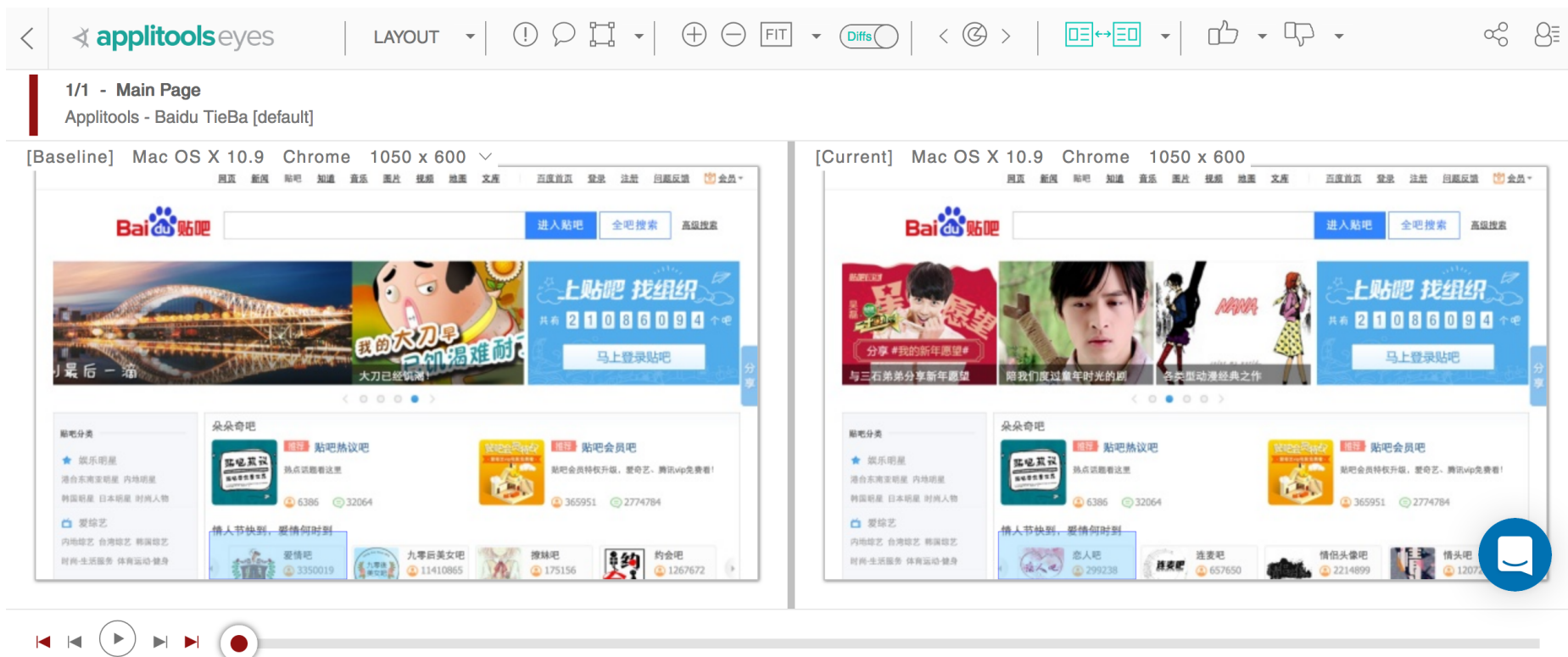
Applitools [default] Mac OS X 10.9 Chrome 1050x600

1 steps

视觉验证 — Applitools



视觉验证 — Applitools



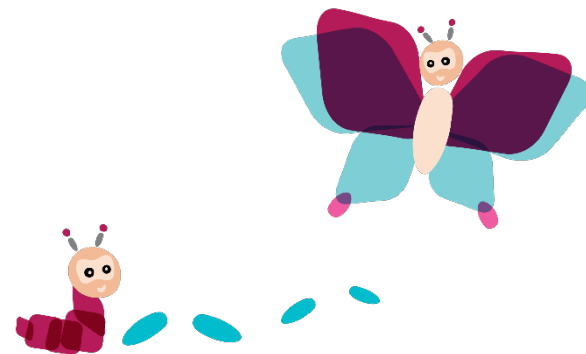
实践&价值



- 找准验证对象 (document vs element)
- 全程自动化是不现实的
- 独立运行才是最有效的
- 不要想着抢功能测试的饭碗
- 记住这是回归测试
- CI & CD



- 弱文档环境下的需求可视化
- 为快速迭代提供最简单、最直观、最准确UI的回归测试
- 客户可以随时预览TA的产品
- 让QA与其他组员的交流更轻松
- 提高团队自信



谢谢

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