Workflow Trends
in a Rapidly Changing Marketplace

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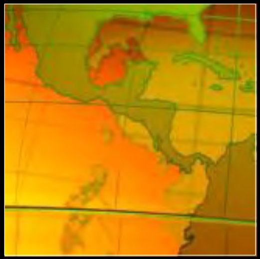
Group Director
June 2, 2015



InfoTrends
A Questex Company

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- Jim Hamilton print sample YouTube channel
- Business Development Strategies
- Assessment and Benchmarking

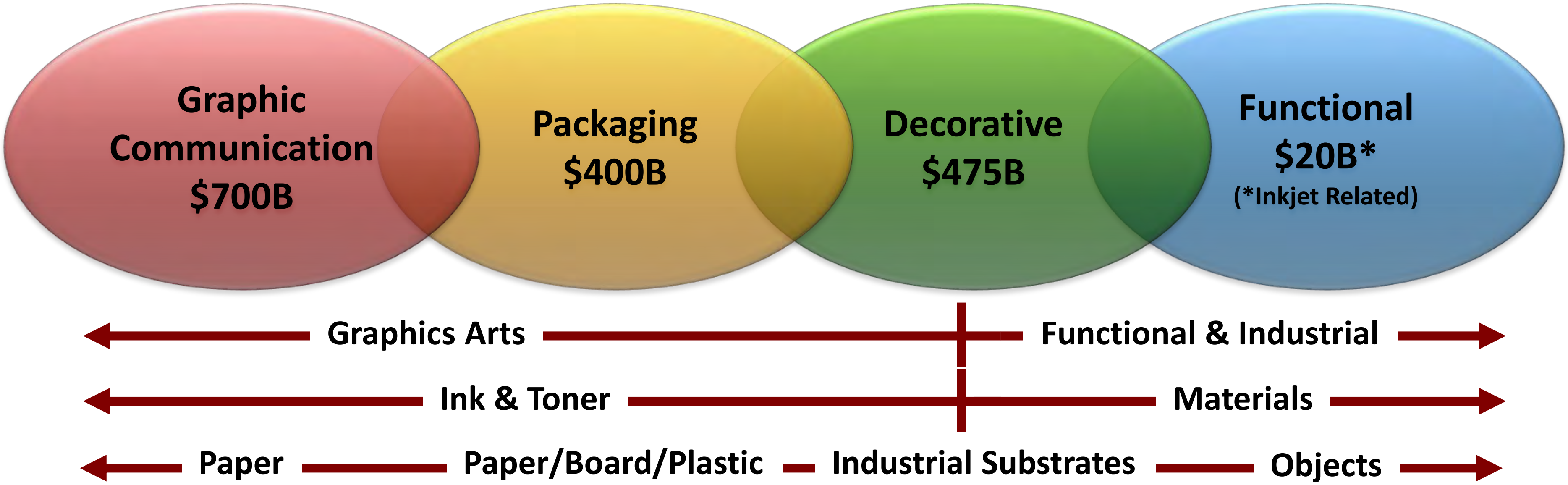
InfoTrends’ research leveraged for today’s presentation:

- **U.S Printing, Publishing, and Packaging Market Size & Outlook, 2013-2018**
- **Production Print Services in North America: Understanding Industry Transformation, InfoTrends, 2014**
- **U.S. Production Software Investment Outlook: 2015**
- **Trends in Color Management, 2015**
- **(The Future of the Digital Packaging Value Chain)**

Workflow Trends in a Rapidly Changing Marketplace

The Production Print Market Today

Production Print Application Landscape



- Addressing
- CAD
- Photo
- Promotional
- Publishing
- Sign & Display
- Transactional

- Brand protection
- Coding/Barcodes
- Consumer Labels
- Corrugated
- Direct-to-shape
- Flexible Packaging
- Folding carton

- Ceramics
- Glass
  - Architectural
  - Automotive
  - Consumer electronics
  - Consumer goods
- Laminates
  - Wall/Floor covering
  - Wood
- Textiles

- 3D
  - Prototypes
  - Tooling
  - Manufacturing
- Printed Electronics
  - Semiconductors
  - Displays
  - Solar panels
- Biomedical
  - Pharmaceuticals
  - Organs

Note: Dollar figures represent approximate global market size

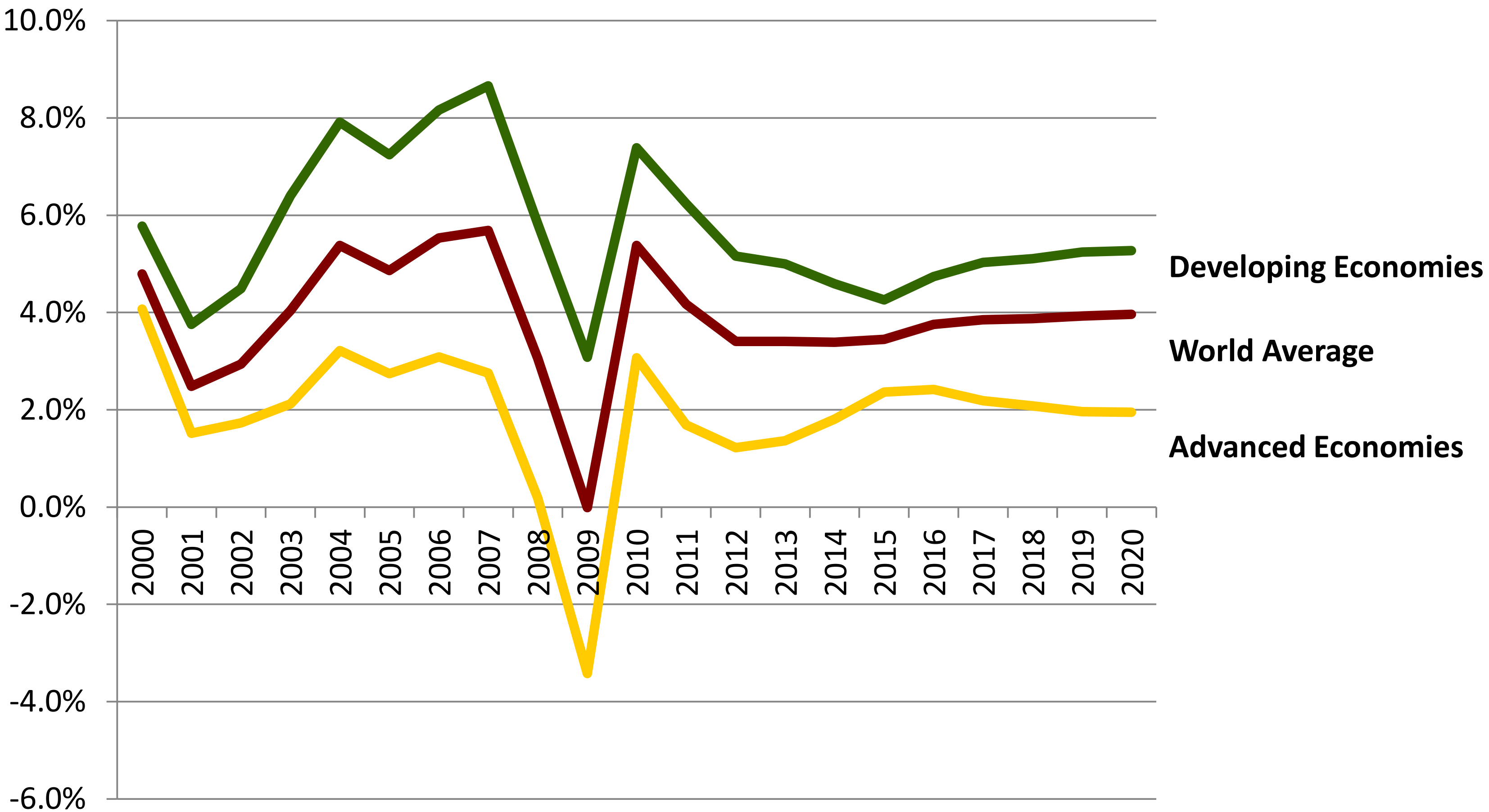
Global Gross Domestic Product (GDP) Growth

Country/Region/Group Name	2010	2011	2012	2013	2014
World	5.4%	4.2%	3.4%	3.4%	3.4%
Emerging Markets	7.4%	6.2%	5.2%	5.0%	4.6%
Advanced Economies	3.1%	1.7%	1.2%	1.4%	1.8%
Euro area	2.0%	1.6%	-0.8%	-0.5%	0.9%
Latin America	6.1%	4.9%	3.1%	2.9%	1.3%
Developing Asia	9.6%	7.7%	6.8%	7.0%	6.8%
Brazil	7.6%	3.9%	1.8%	2.7%	0.1%
China	10.4%	9.3%	7.8%	7.8%	7.4%
India	10.3%	6.6%	5.1%	6.9%	7.2%
Russia	4.5%	4.3%	3.4%	1.3%	0.6%
Central & Eastern Europe	4.8%	5.4%	1.3%	2.9%	2.8%
Canada	3.4%	3.0%	1.9%	2.0%	2.5%
Japan	4.7%	-0.5%	1.8%	1.6%	-0.1%
United States	2.5%	1.6%	2.3%	2.2%	2.4%

- **Gross Domestic Product database is released twice yearly**

Source: International Monetary Fund: World Economic Database, April 2015

The Global Economic Outlook



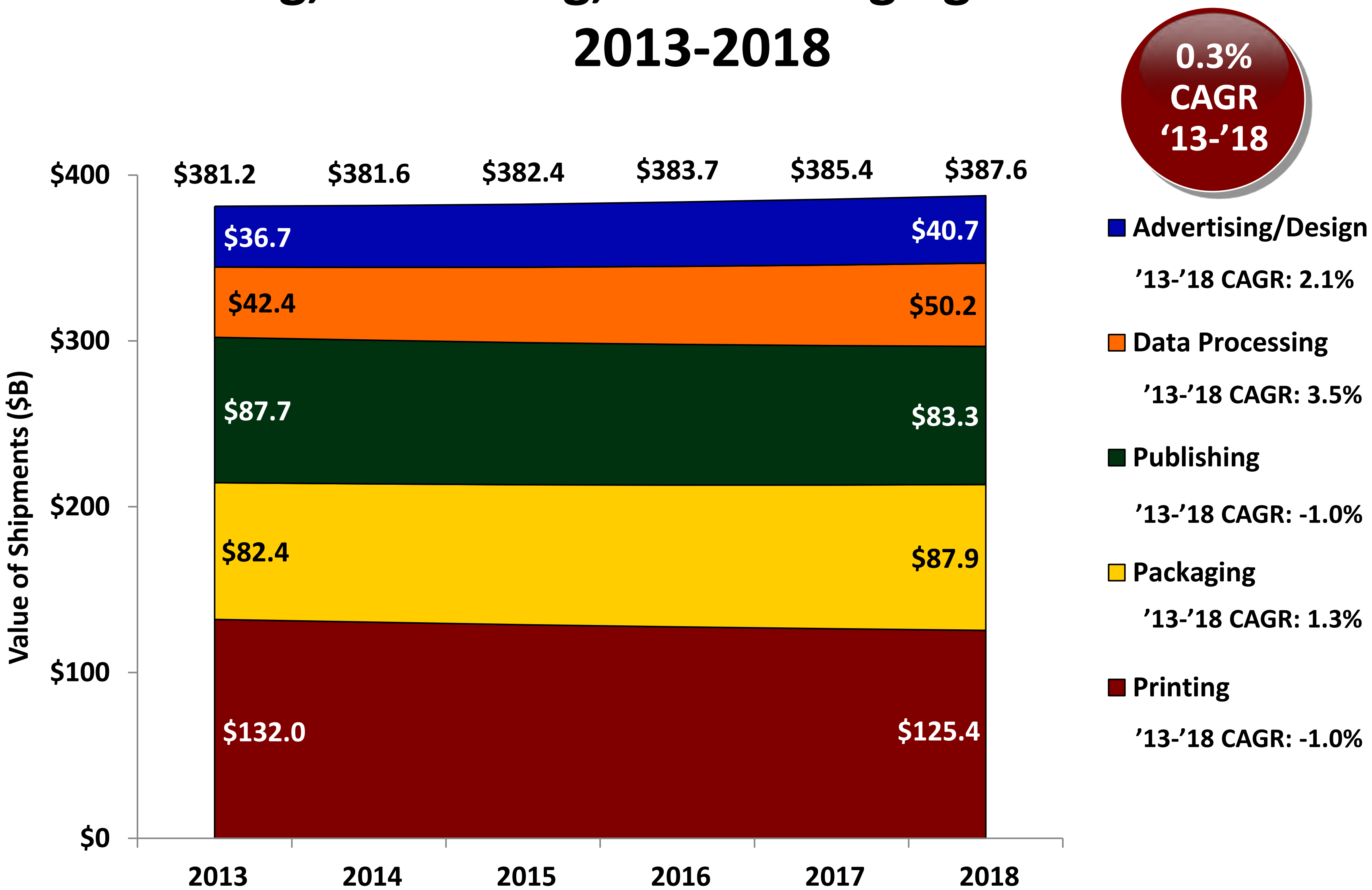
- **GDP growth, but fairly anemic in the advanced economies…**

Source: International Monetary Fund: World Economic Database, April 2015

Major Categories in the U.S. Printing & Publishing Market

Printing	• Establishments primarily engaged printing and related services; including in-plants, copy centers, and direct mail advertising services
Publishing	• Establishments engaged in the publishing of newspapers, magazines, other periodicals, books, and greeting cards
Packaging	• Establishments engaged in converted paper product manufacturing including labels, folding cartons, and flexible packaging
Advertising/ Design	• Includes advertising agencies and commercial art & graphic design
Data Processing	• Establishments primarily engaged in data processing activities for business customers

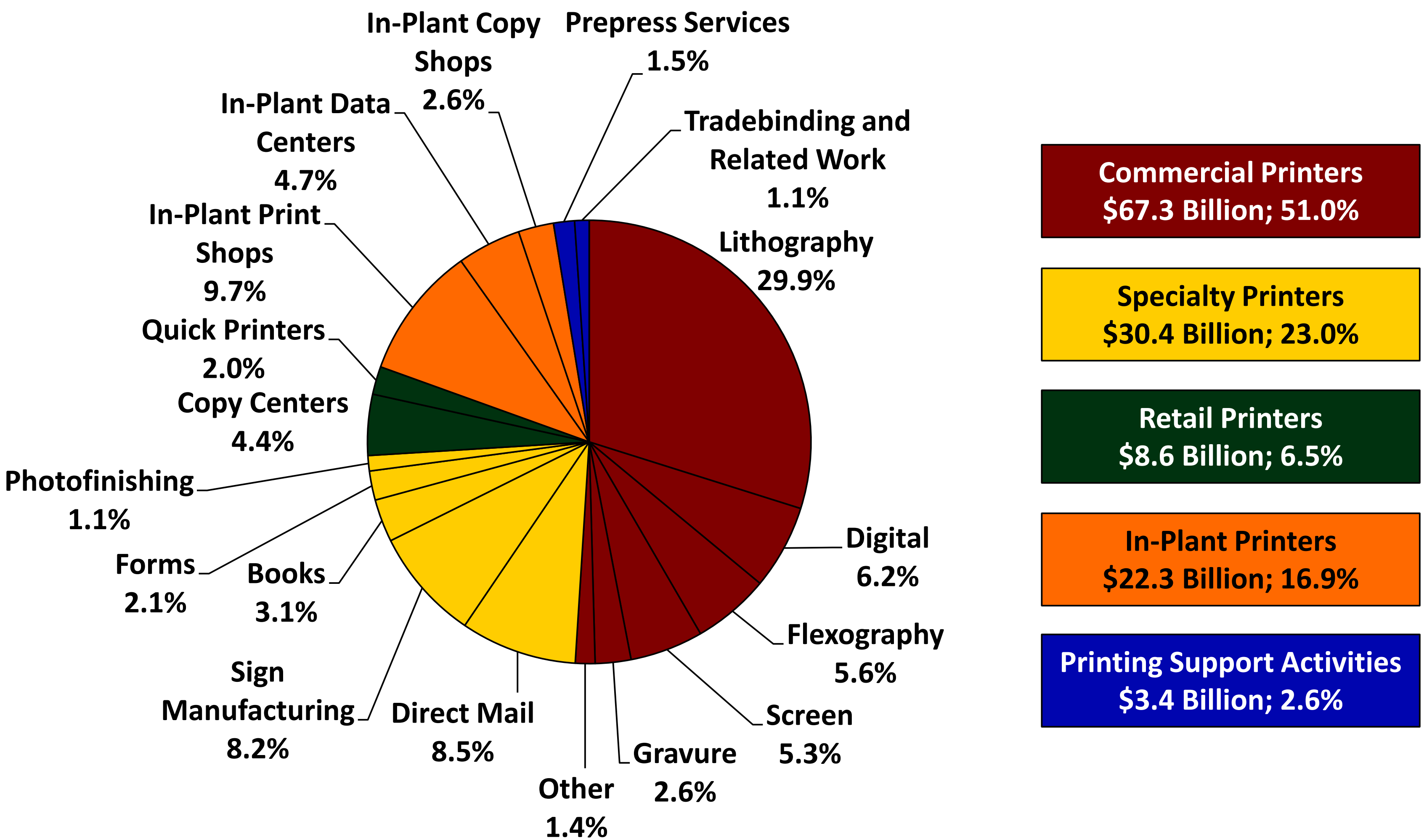
U.S. Printing, Publishing, and Packaging Market Forecast: 2013-2018



Value of Shipments = The dollar value of products sold by establishments based on net selling values. Freight charges and excise taxes are excluded. Where the products are customarily delivered to distributors or consumers by the manufacturing establishment, the value is based on delivered price rather than free on board (f.o.b.) plant price.

Source: InfoTrends’ U.S. Printing, Publishing, and Packaging Market Forecast: 2013-2018

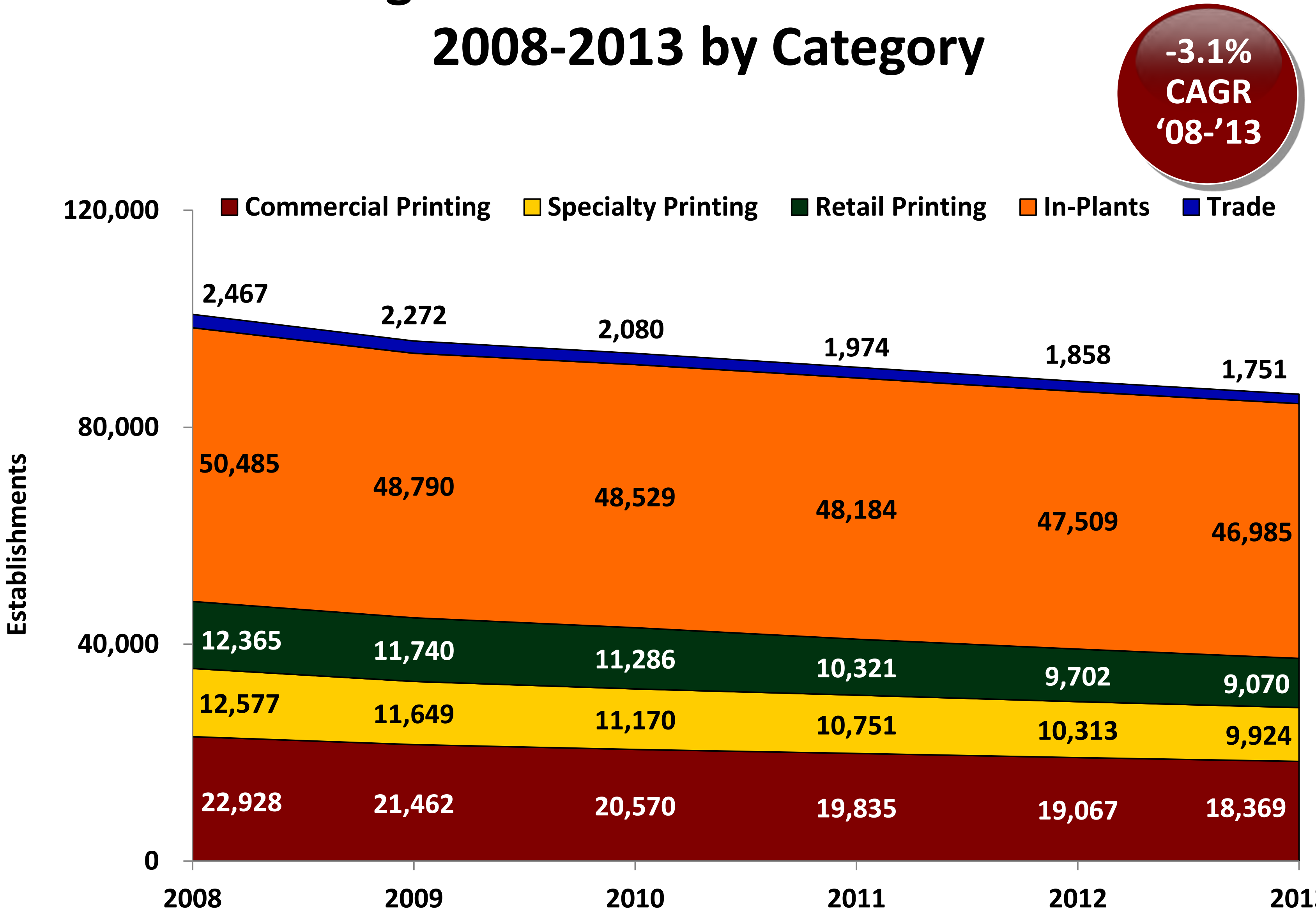
U.S. Printing and Related Services Value of Shipments: 2013 = $132.0 Billion



Note: Value of shipments by primary production method of service provider. Even if a service provider is engaging in multiple production methods (e.g. offset and digital), all value of shipments get categorized by the primary method.

Source: InfoTrends' U.S. Printing, Publishing, and Packaging Market Forecast: 2013-2018

U.S. Printing and Related Services Establishments 2008-2013 by Category



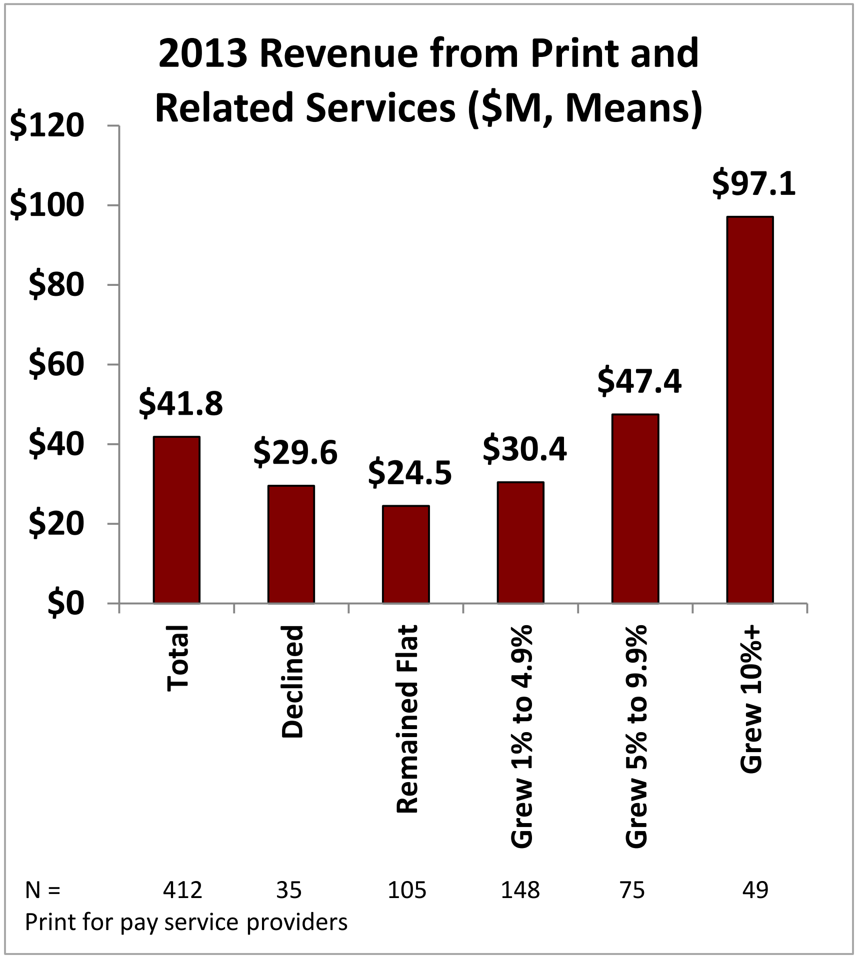
Source: InfoTrends' U.S. Printing, Publishing, and Packaging Market Forecast: 2013-2018

Production Print Services in North America

- **Growth:** What are growing print service providers doing?
- **Consolidation:** Will it continue/accelerate?
- **Focus:** What areas are important? (sales & marketing, value-added services, reliance on print, web to print)
- **Investment:** Where are the software & hardware investments happening?

Biggest Print Service Providers are Doing the Best

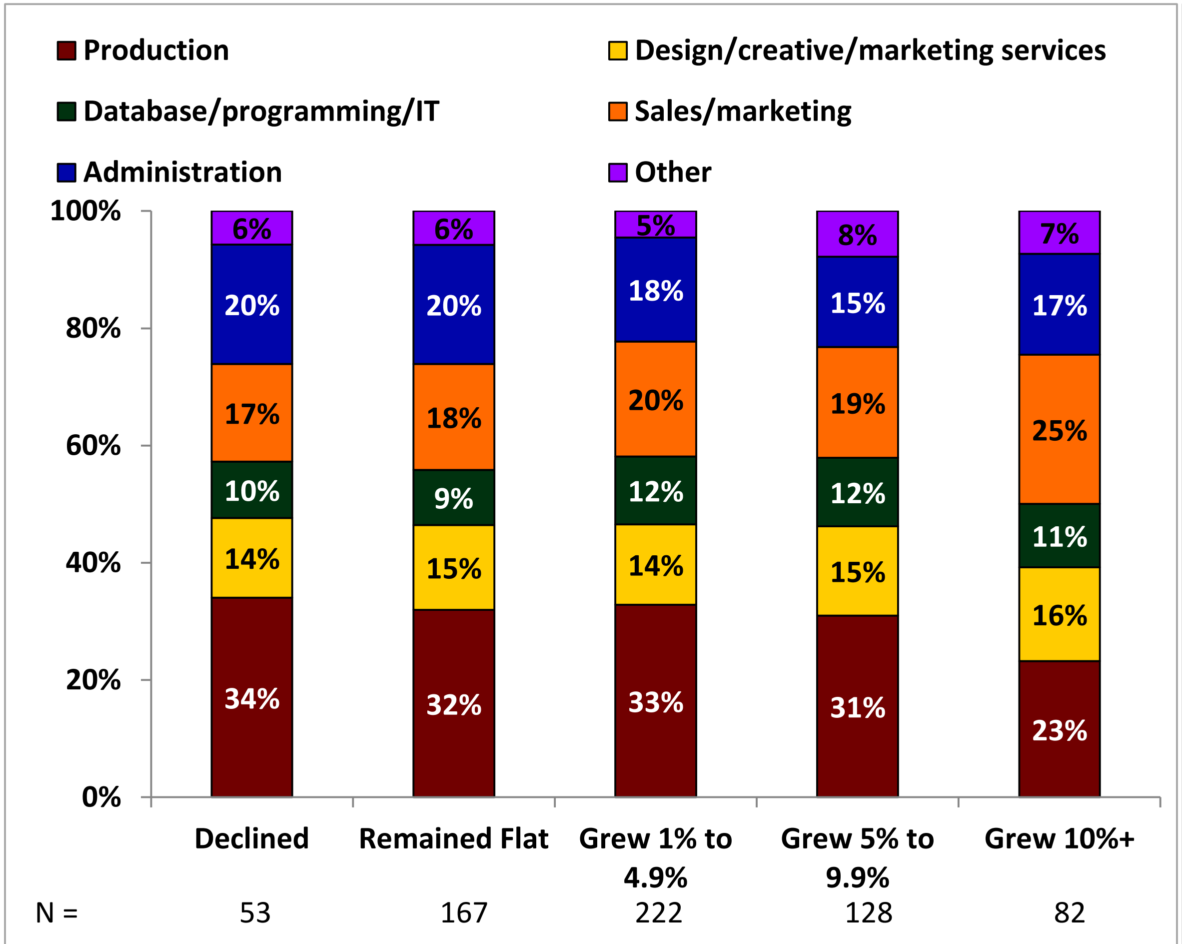
Approximately what was your company's annual revenue for printing and related services in 2013?



- **The print service providers with the highest revenue in 2012 also experienced the greatest growth**
- **The large revenue streams enable these companies to investment in home-grown software platforms as well as staffing for new services and sales & marketing**
  - This is in addition to other more traditional areas of investment such as printing & finishing equipment and commercial software.
- **The mean (average) respondent is $41.8 million, but the median is smaller (between $5M and $10M)**
  - Some very large PSPs pull the average up

Thriving PSPs Allocate More Resources to Sales & Marketing

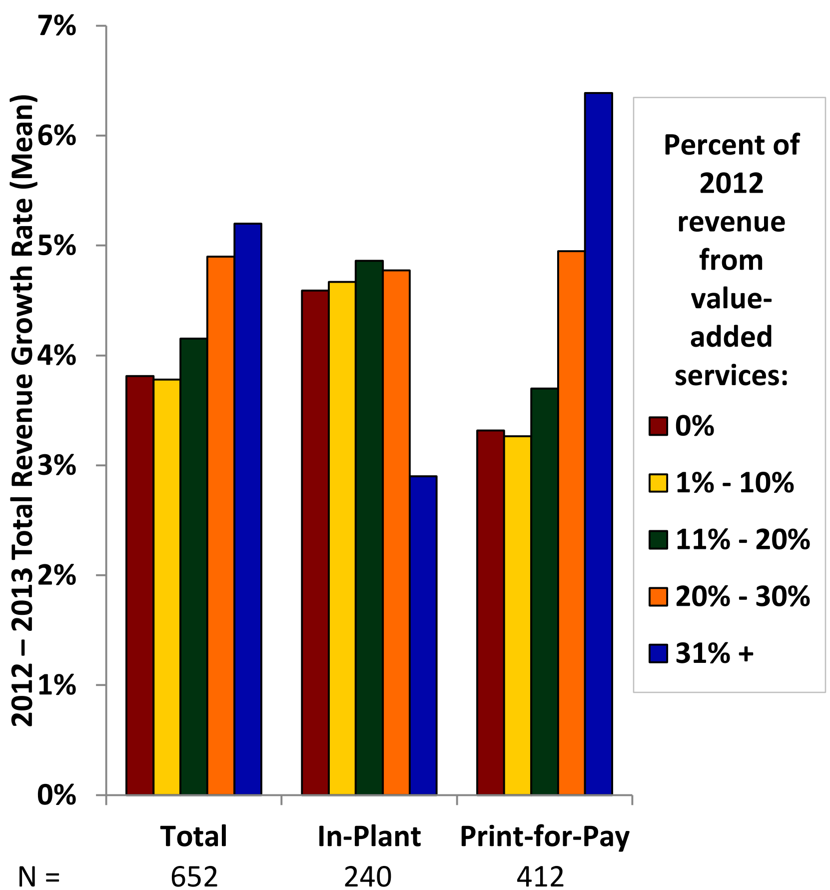
Approximately what percentage of your total employees fall into these job categories?



- **Investment in sales/marketing is highest in those sites that reported strong growth**
  - The biggest difference in employees between the revenue bands is in the production-related employees, with a 10 point difference between those that declined and those that grew 10%+

Higher Focus on Value-Added Services Tends to Lead to Greater Growth

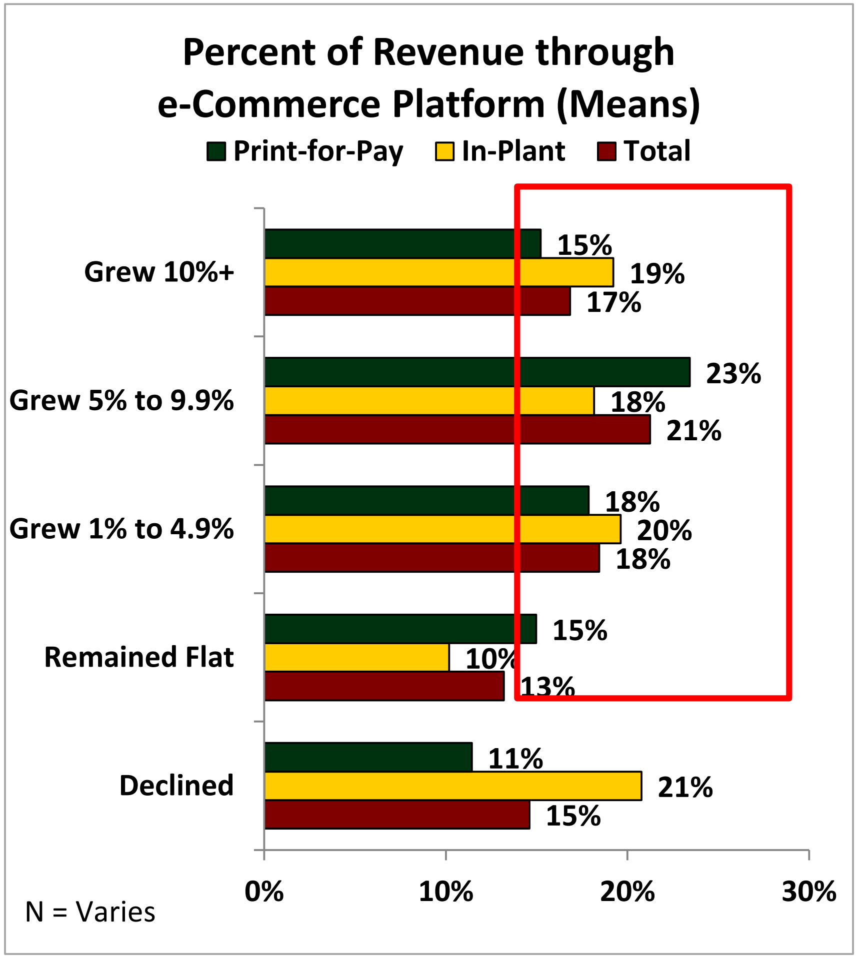
What percent of your income comes from the value-added services?



- **Overall, service providers with the greatest percentage of revenue from non-print, value-added services experienced the greatest revenue growth from 2012-2013**
- **This was particularly true in print-for-pay sites**
- **The same trend did not hold true for the highest growth in-plants**

Web-to-Print Activity Is Higher for Growth Print for Pay Sites

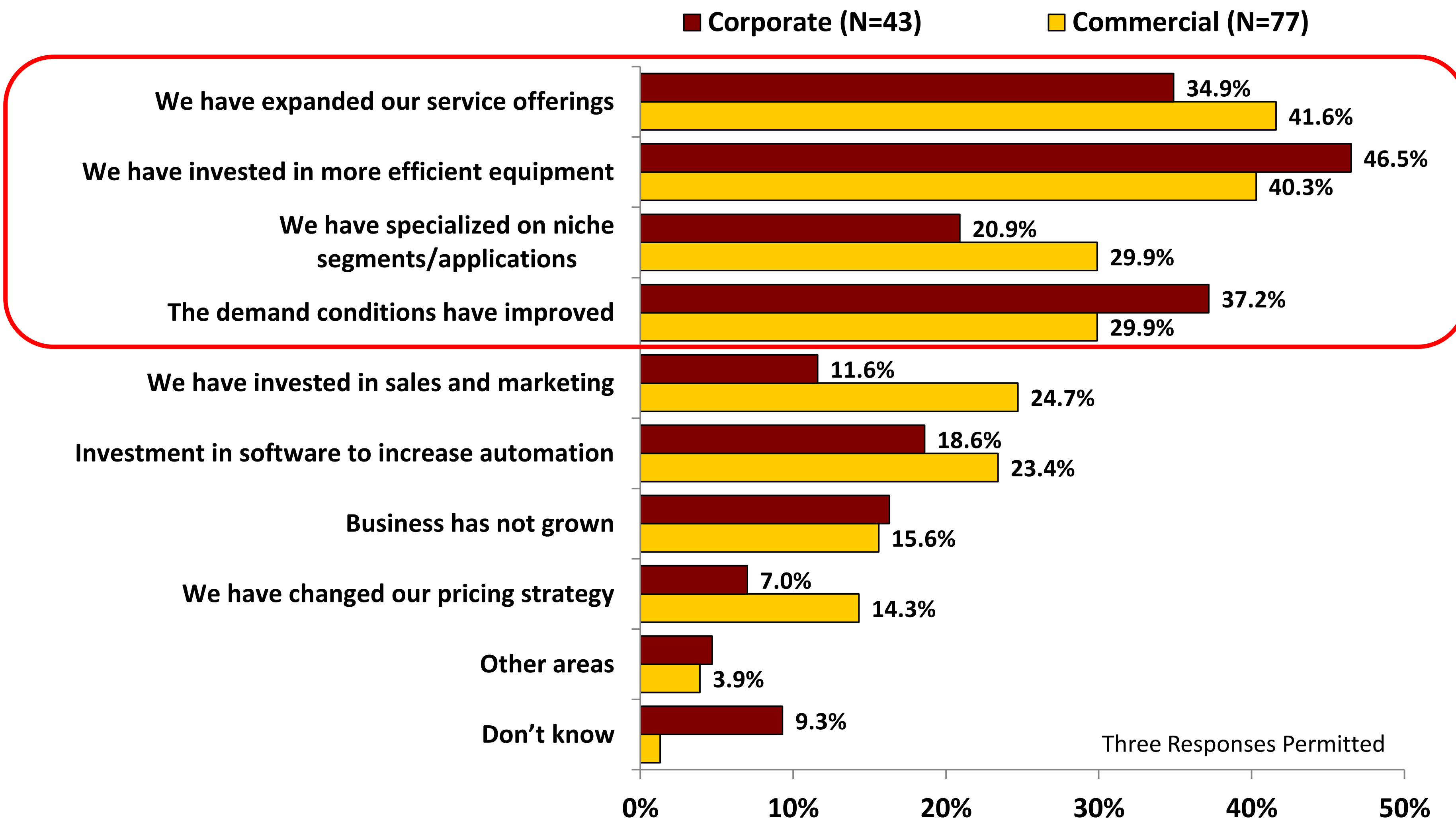
What percentage of your print business, comes from web-to-print / e-commerce?



- **Growth print-for-pay sites had higher percentages of print revenue received from their e-Commerce or Web-to-Print systems than those that were flat or declining**
  - Print-for-pays that declined had the lowest percentage of revenue from Web-To-Print at 11%
- **This trend did not hold true for declining in-plants, which had a high percent of their business come from e-Commerce / Web-to-Print**

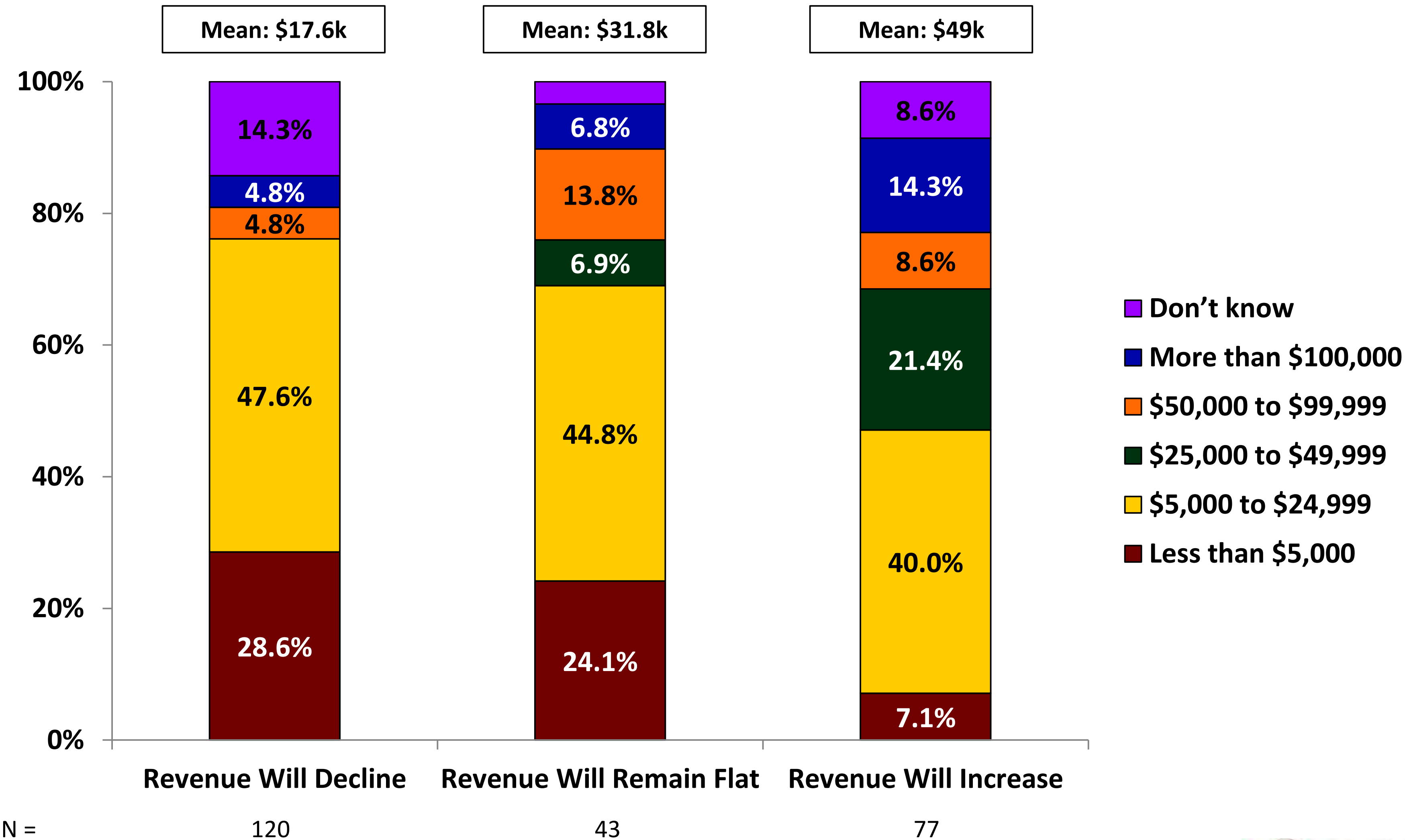
Why Business Has Grown

Q38: If your business has grown, why do you think this is so?



Annual Software Spend by Revenue Change

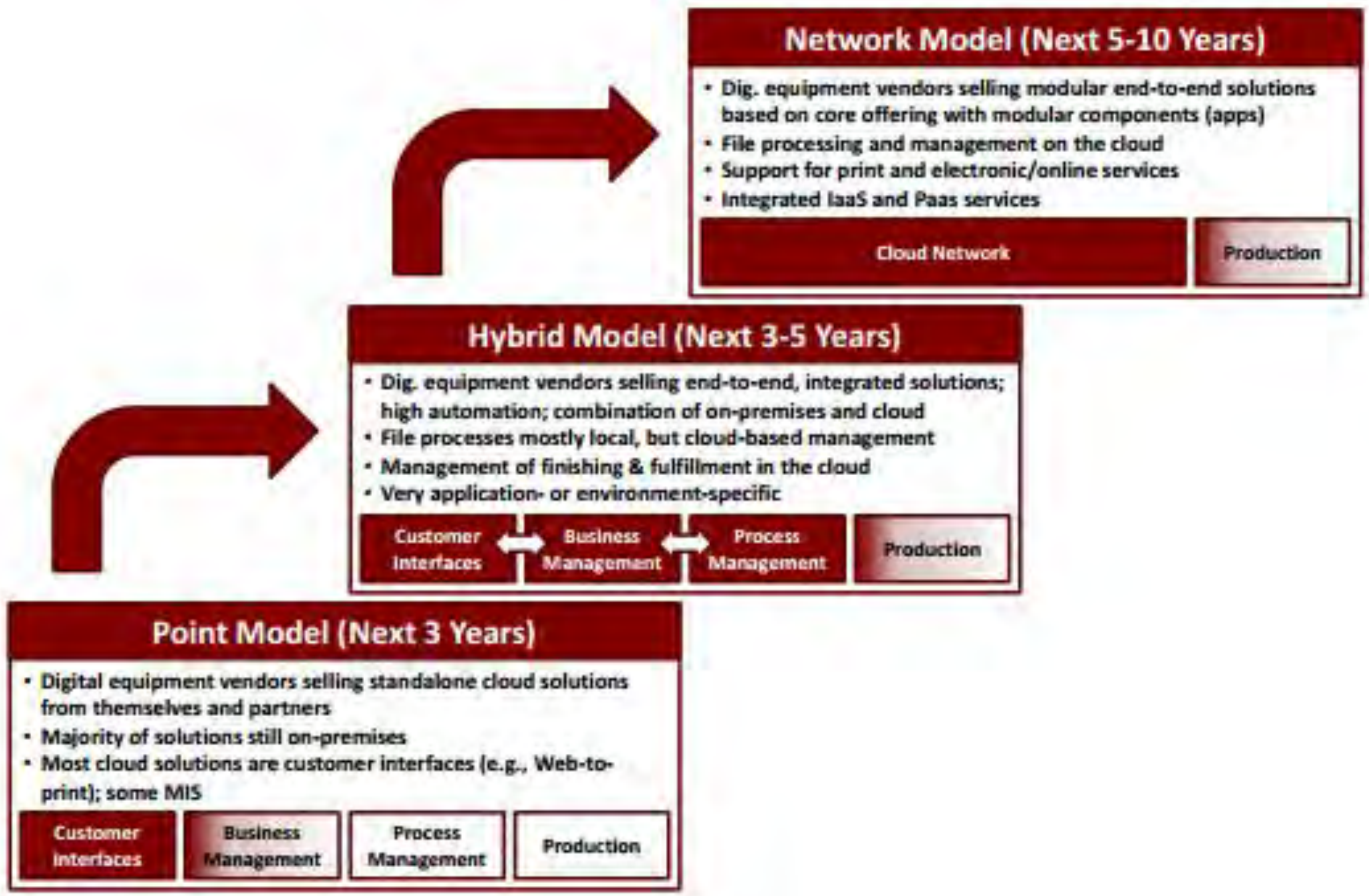
Q17: In general, how much does your company spend annually on software?



Source: U.S. Production Software Investment Outlook: 2015

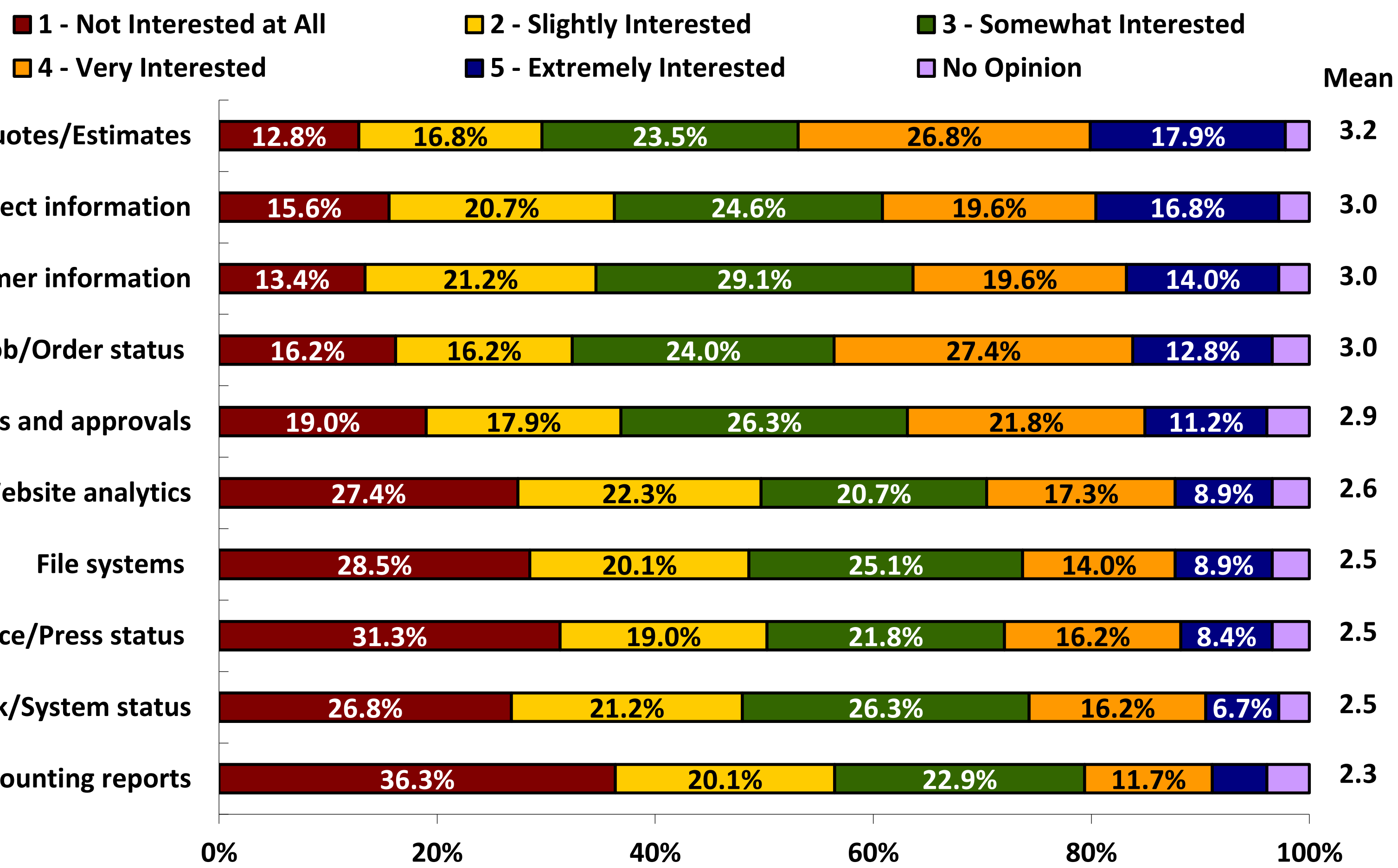
Workflow Trends
in Commercial Print

The Start of the Integrated Cloud



Cloud-based Color Management

Mobile from the Beginning to End



N = 179 Print Service Providers

Source: U.S Production Software Investment Outlook, InfoTrends, 2012

Compact Workflows

Characteristics of Compact Workflows

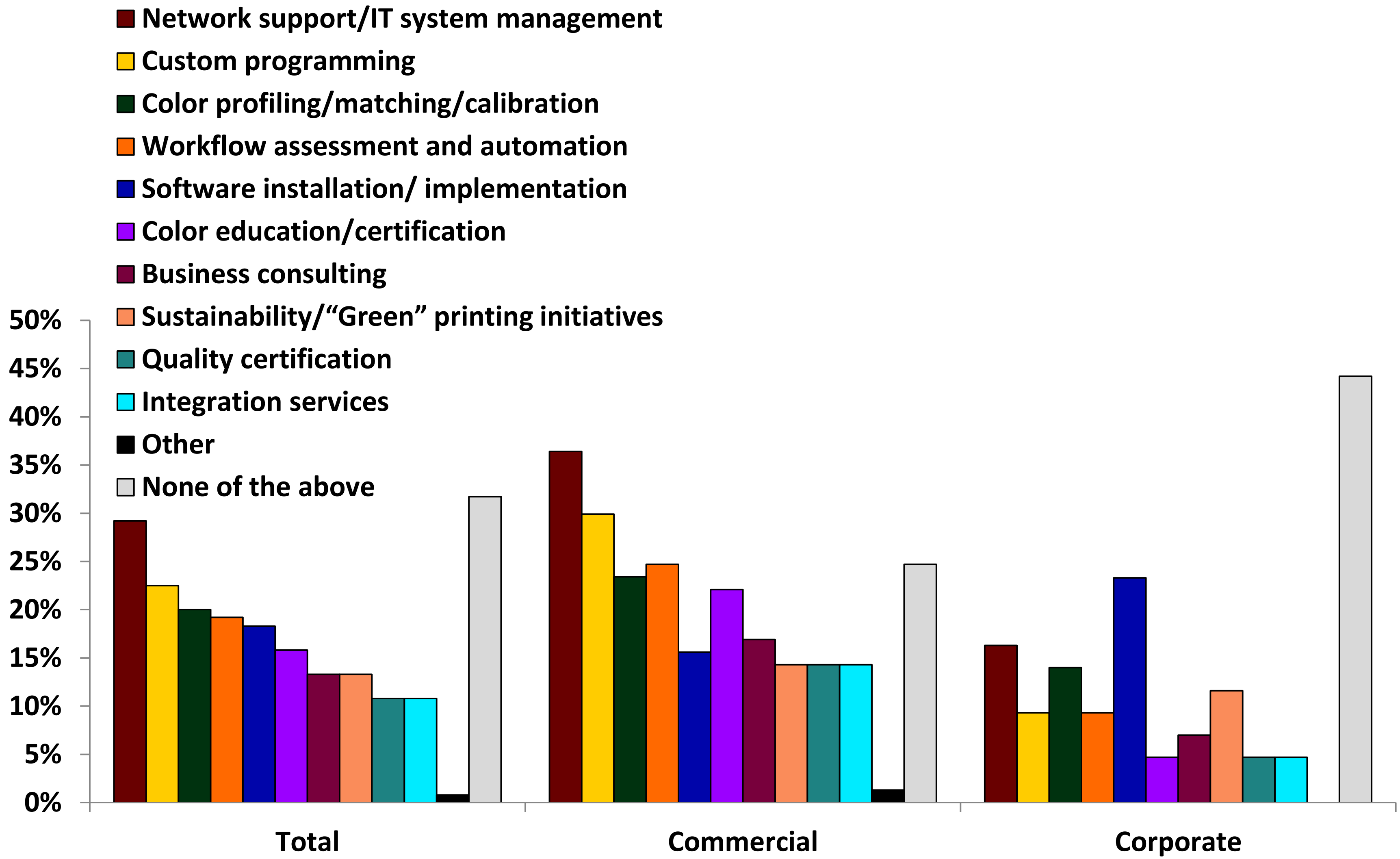
- **Delivered via software-as-a-service (SaaS)**
- **Built upon the premise that the majority of jobs originate online (in some cases integrating orders from multiple sources) and are standardized into a single back-end production system**
- **Incoming orders are loaded into the system, preflighted, routed based on metadata, imposed, and batched for production**
- **Contains print management functions for job ticketing and scheduling, usually through batching via advanced queries with a focus on meeting SLAs**
- **Output management and routing to a variety of digital front ends**
- **Includes shop floor data collection with live updating of job status that is consolidated into user-customizable dashboard views**
- **Additional integrations to other online platforms, e.g., third-party shipping, accounting**

Compact Workflow:

A workflow combining multiple software components compressed into one package to fit a specific type of print operation, e.g. a high number of orders of customized products.

Source: OneFlow Systems

Professional Services for Outsourced Expertise

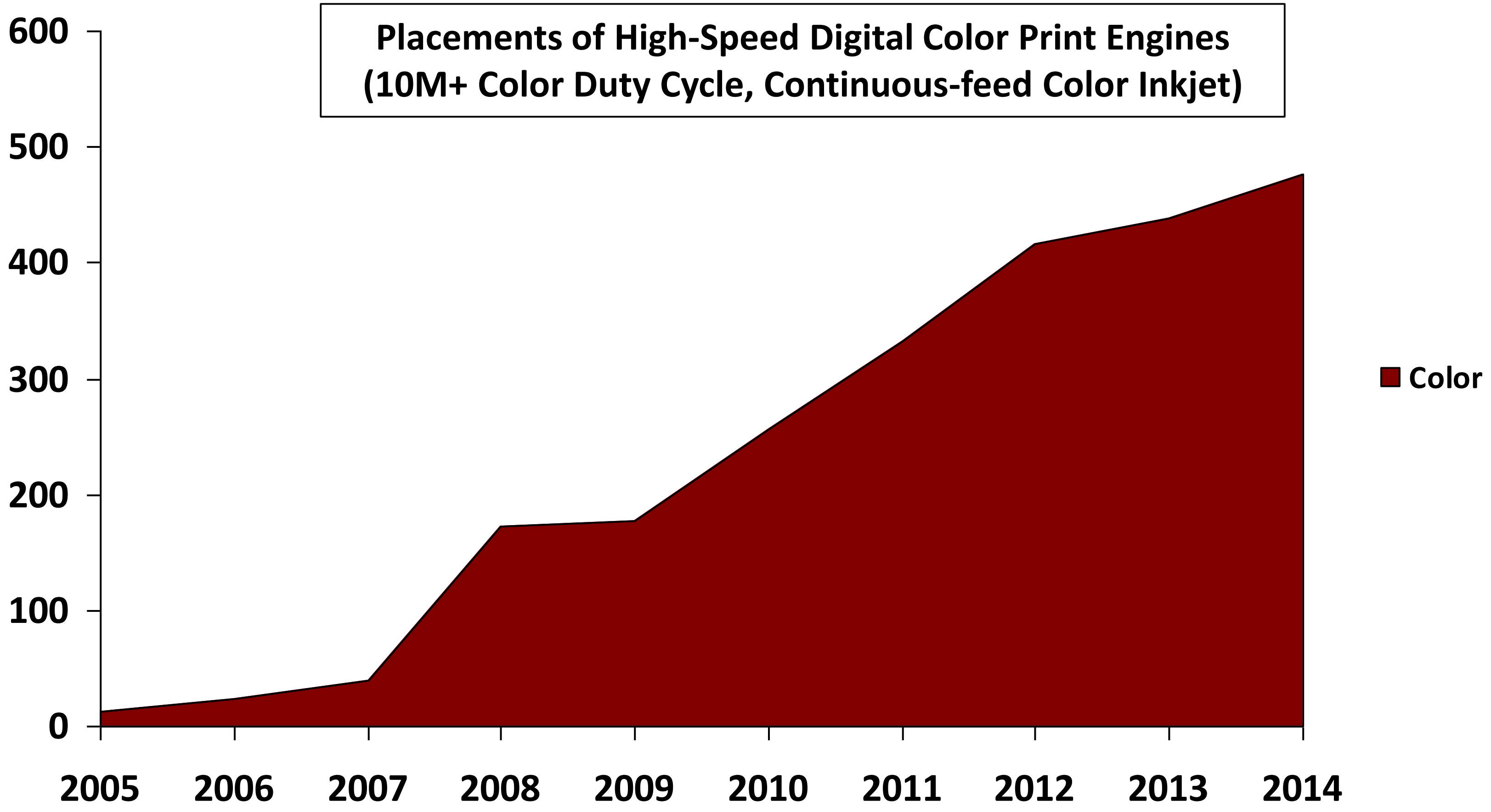


N = 120 43 77

Source: *U.S. Production Software Investment Outlook*, InfoTrends, 2015

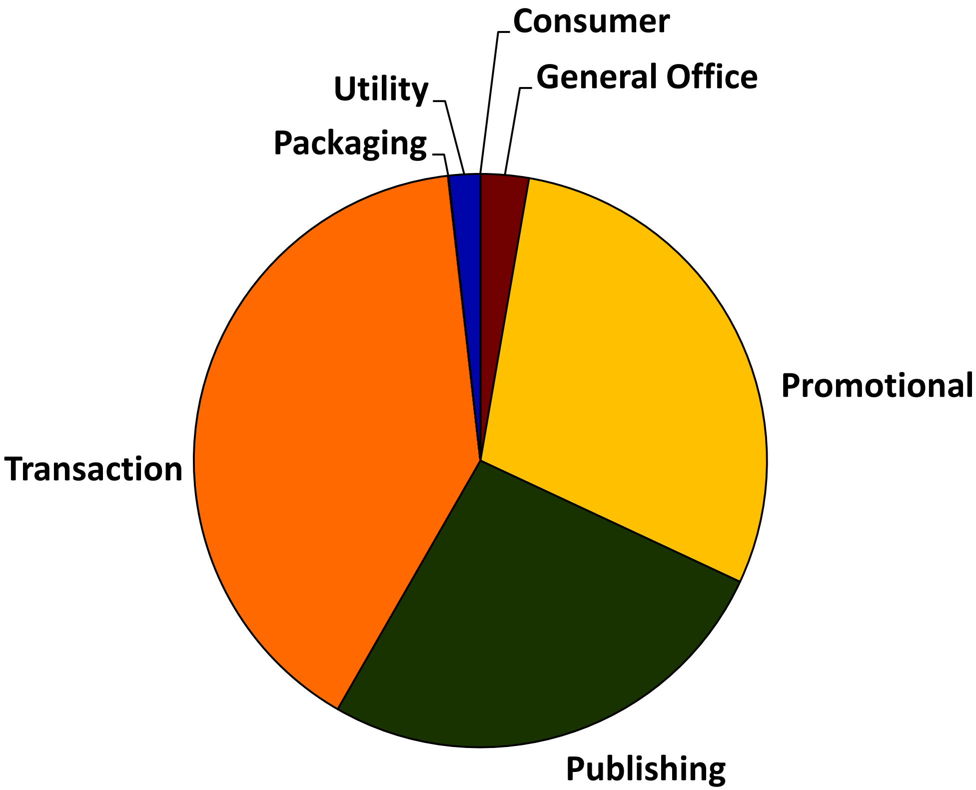
The Impact of Highly Productive Digital Print Technologies

Production Color Digital Inkjet Printing Growth since 2005



Source: InfoTrends Quarterly Market Tracking Program

Print Application Volume (10M+ Color Duty Cycle)

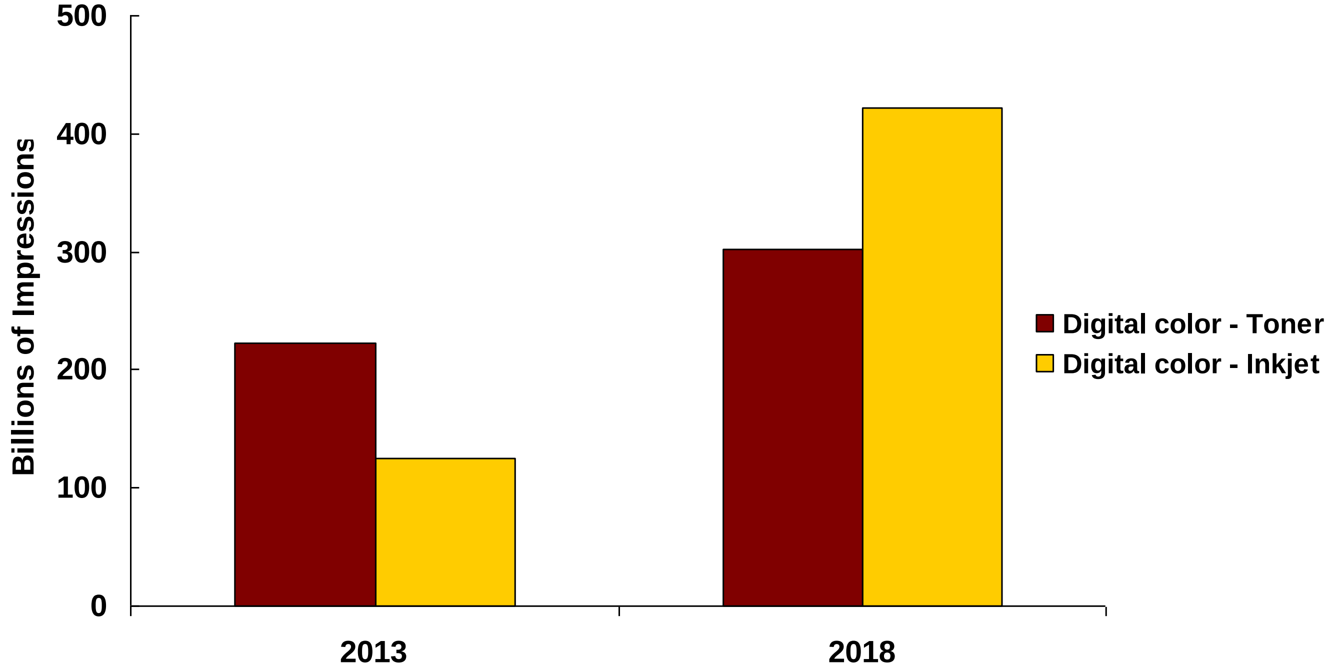


58.8 billion pages (2013, U.S.)

General Office	Business cards
	CAD/rendering
	Letterhead, other office documents
	Presentations
	Proposals, reports
Promotional	Brochures
	Catalogs
	Direct Mail
	Inserts, coupons
	Posters, banners, signage
Publishing	Books
	Directories
	Greeting cards
	Magazines
	Manuals
	Newspapers/newsletters
Transaction	Bills, statements
	Checks
	Sys-out
	TransPromo
Packaging	Flexible packaging
	Folding cartons
	Labels
Utility	Forms
	Proofing
	Security Print
Consumer	Fine art
	Photo merchandise

Source: U.S. Digital Production Printing Application Forecast: 2012-2017, InfoTrends

Global Digital Production Color Print Volume by Technology



- **Global production color volumes totaled about 348 billion impressions in 2013**
- **InfoTrends expects them to exceed 725 billion by 2018**
  - Production color inkjet accounted for 36% of the total production digital color volume in 2013 and will account for 58% in 2018
  - This occurs despite the fact that digital color toner is also growing at a healthy rate

Source: InfoTrends Global Production Printing & Copying Market Forecast: 2013-2018

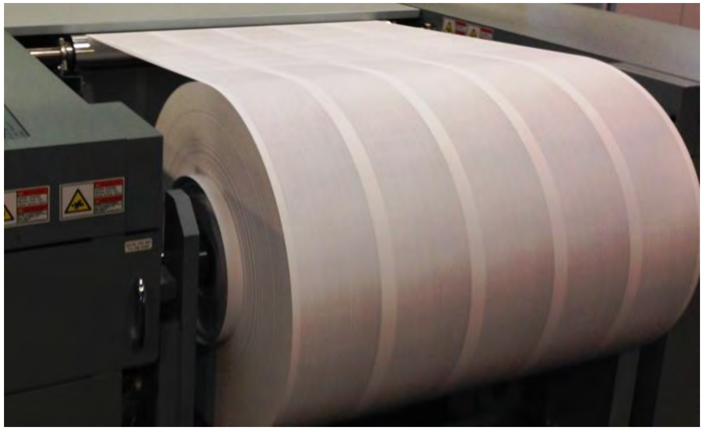
High-speed inkjet systems are producing high volumes for transaction, direct mail, and books, not because they are cheaper than offset, but because ***they can do something that offset cannot do***

Lessons Learned

	Transaction
Area coverage	Low
Substrates	Primarily uncoated
Feed type	Comfortable with roll-fed
Quality expectations	Moderate
Key digital advantages	Forms replacement; use of variable color; personalization; lights out production
Other factors	MICR

Digital Print Facilitates Compelling Business Transformations

- **The printer as a virtual document warehouse for books or promotional materials**
  - On demand printing
  - Just-in-time manufacturing
- **Process automation**
  - Web-to-print fulfillment
- **Mass customization**
  - 1:1 and segmented communications
  - Mail optimization
- **Cost effective use of static or variable color**
  - Including forms replacement



Inkjet Recommendations for Commercial Printers

- **Identify an application focus:**
  - Catalogs
  - Direct mail
  - Promotional materials
  - Publications
  - Non-document applications (signage, labels, packaging, etc.)
- **Confirm which technology is best suited for the application**
  - Based on print volume, area coverage, format, running cost and substrate requirements
- **Seek out opportunities for new products/services and process reinvention**
- **Determine where the bulk of your volume will come from**

Inkjet Recommendations for Commercial Printers (2)

- **Use inkjet to add new applications or transform your business model**
  - Process improvement/operational efficiency
  - Just-in-time manufacturing
  - Creation of unique rather than mass manufactured content
- **Carefully assess any system vendor's paper strategy**
- **Consider the cost of front-end systems and finishing requirements in the overall workflow**
- **Be sure that your system vendor has a good understanding of your market and application requirements**

Automation

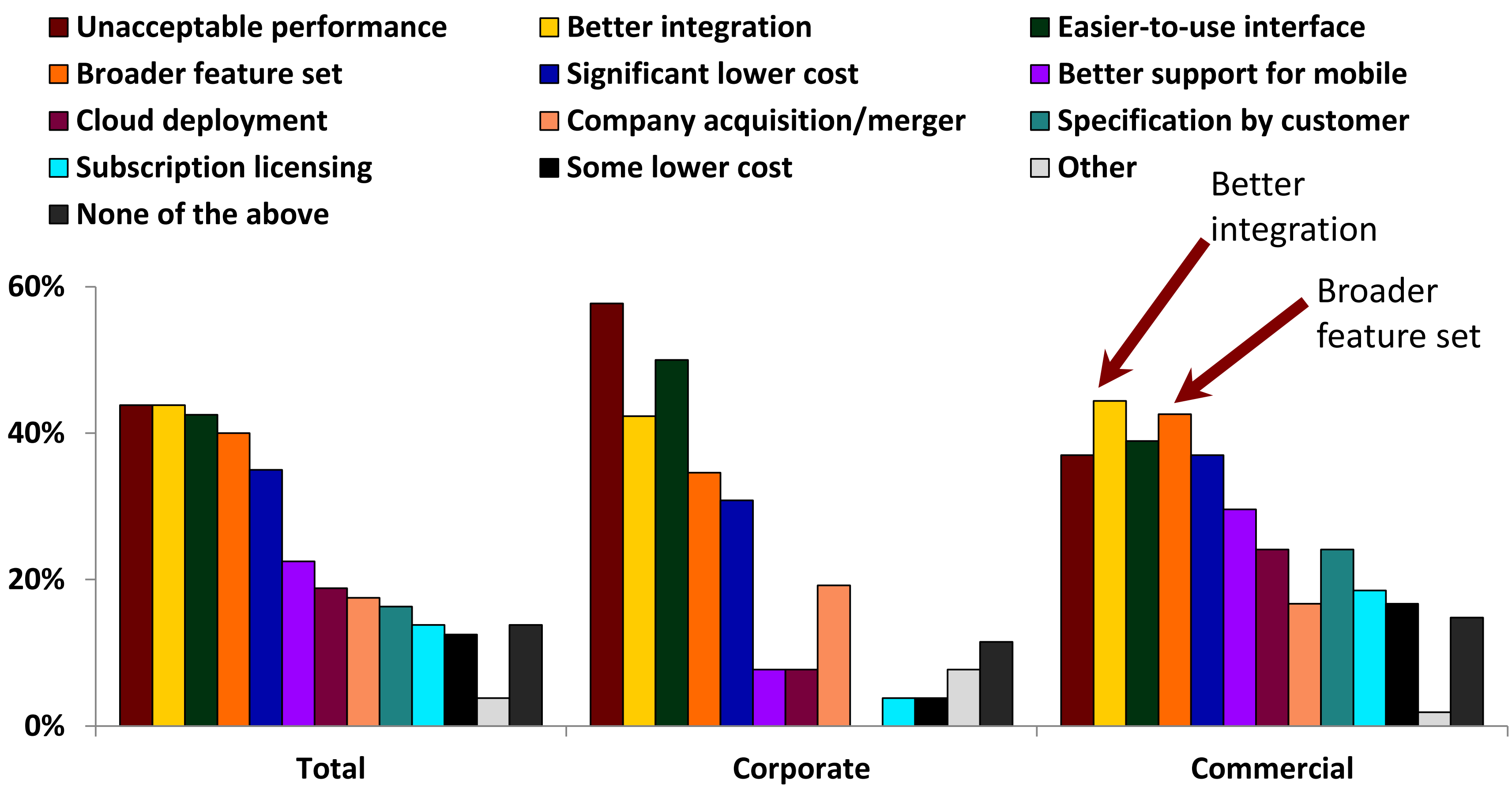
Web-to-Print by the Numbers: Commercial Printers

- **30% have no web-to-print system**
- **43% have more than one web-to-print system**
- **8 = The number of customized web-to-print storefronts that commercial printers are currently running/hosting**
- **31% of web storefront traffic comes from mobile**
  - But 37% have no mobile capabilities on their storefront(s)
- **3 years = The length of time that a storefront lasts before it is replaced or shut down**
- **48% chance that a site will upgrade/replace its existing web-to-print system in the next 12-24 months**

Source: U.S. Production Software Investment Outlook: 2015

Factors for Switching Web-to-Print Vendors

Q29: What would trigger a change of your primary web-to-print system to another vendor?



N = 80 26 54

Base: Respondents with a web-to-print software system

Multiple Responses Permitted

Source: U.S. Production Software Investment Outlook: 2015

InfoTrends Color Management Research

- **To understand the challenges print service providers face in regards to producing consistent, repeatable color and what initiatives and technology has been implemented to assist in this effort**
  - Based on responses from 122 print-for-pay and print-for-cost (in-plant) providers
    - Survey conducted in February 2015
  - *Emerging Trends in Production Printing* program
    - Quarterly survey with a focus on market trends, strategic issues, and hot topics
- **Survey launched in a partnership with NAPCO (Printing Impressions, In-plant Graphics Magazines)**
- **Respondents were offered a report of the findings if they offered their e-mail address within the survey**

Key Findings

- **Print service provider's top reasons for managing color are consistency, repeatability, and accuracy**
- **Most sites expect the amount of color critical work to increase**
- **The majority of print service providers use internal staff for color management initiatives**
- **Key challenges for implementing color management are constrained staff resources, technical skill sets, and time**
- **Quality control is still largely a manual process**

Color Management by the Numbers: Commercial Printers

- **Top two color management benefits**
  - Reducing the amount of rejected work
  - Reducing the amount of reprints
- **Number 1 reason for color management**
  - Repeatability of color for reprints
- **Approximately 40% of commercial printers with less than 20 employees do not manage color**
- **Companies with less than 10 employees do not bring in outside resources (professional services) to help with color management**
  - Yet 27% of companies with more than 100 employees will do so
    - Color-related software training, proof-to-press color matching, and color certification are cited as the most common reason for bringing in outside resources

Source: Trends in Color Management Emerging Trends Research, InfoTrends, 2015

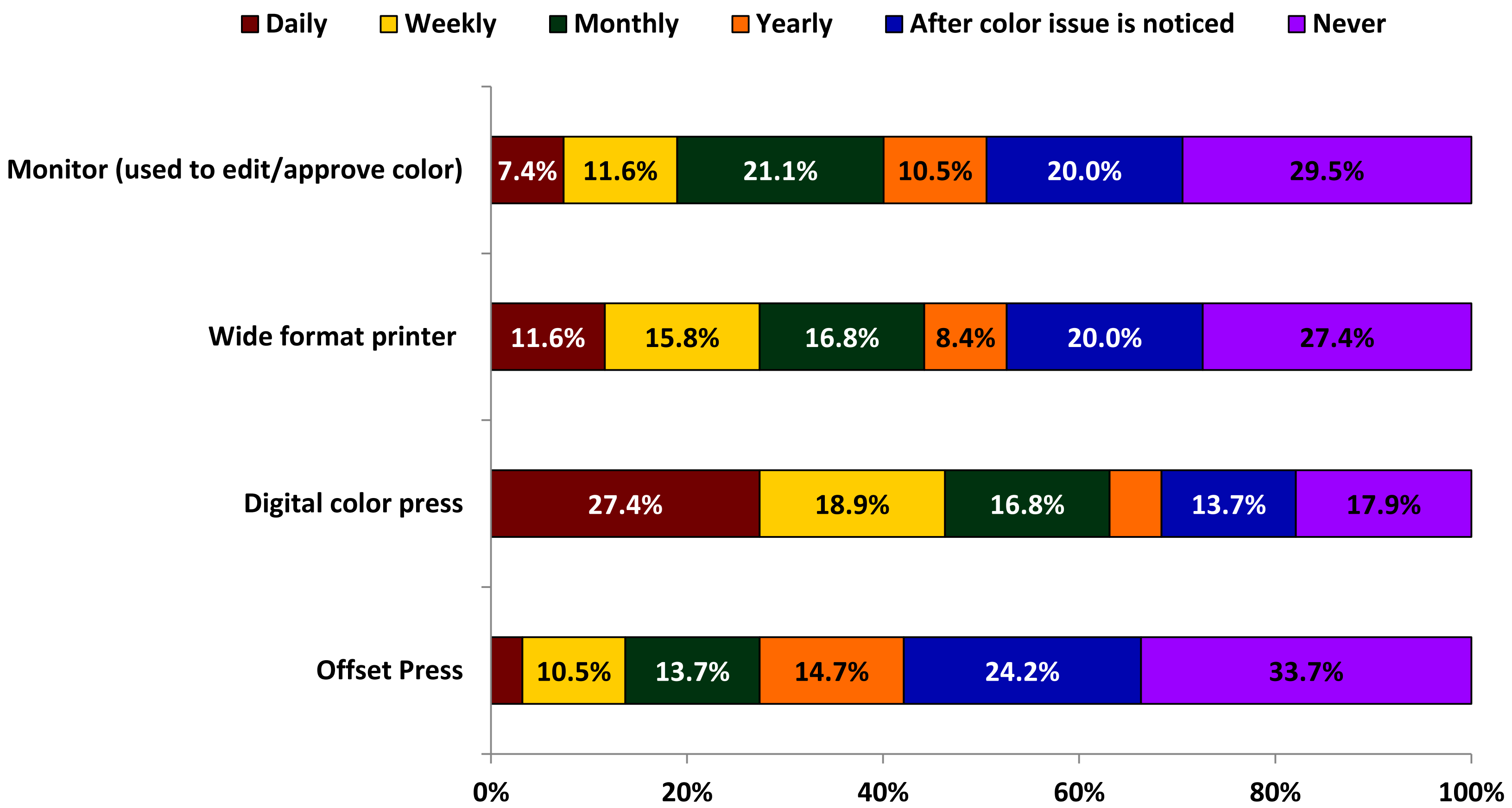
Color Management by the Numbers: Commercial Printers (2)

- **Lack of client demand is the #1 reason for not managing color**
- **$4,056 = The amount commercial printers expect to spend on color management *software* in the next 12-24 months**
- **$3,013 = The amount commercial printers expect to spend on color management *services* in the next 12-24 months**
- **Types of quality control measures implemented**
  - Visual inspection (82%); handheld spectrophotometer (70%); automated on-press color measurement/adjustment (56%)

Source: Trends in Color Management Emerging Trends Research, InfoTrends, 2015

Device Calibration is Not a Priority

Q: How often do you calibrate the following devices:

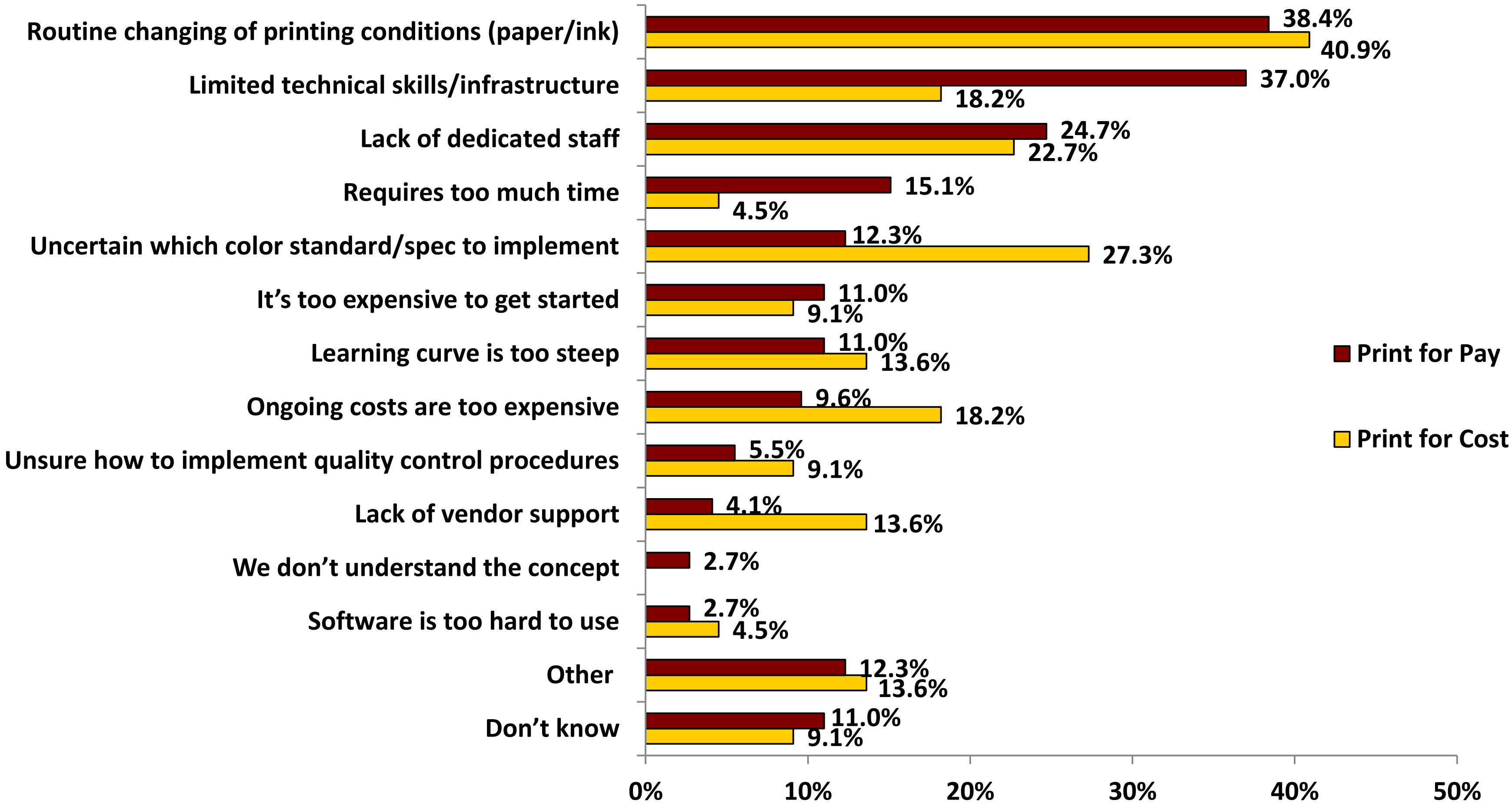


N = 95 respondents

Source: *Trends in Color Management Emerging Trends Research*, InfoTrends, 2015

Top Challenges to Implement Color Mgmt.

Q: What are your top challenges for implementing a color management program at you print production facility?

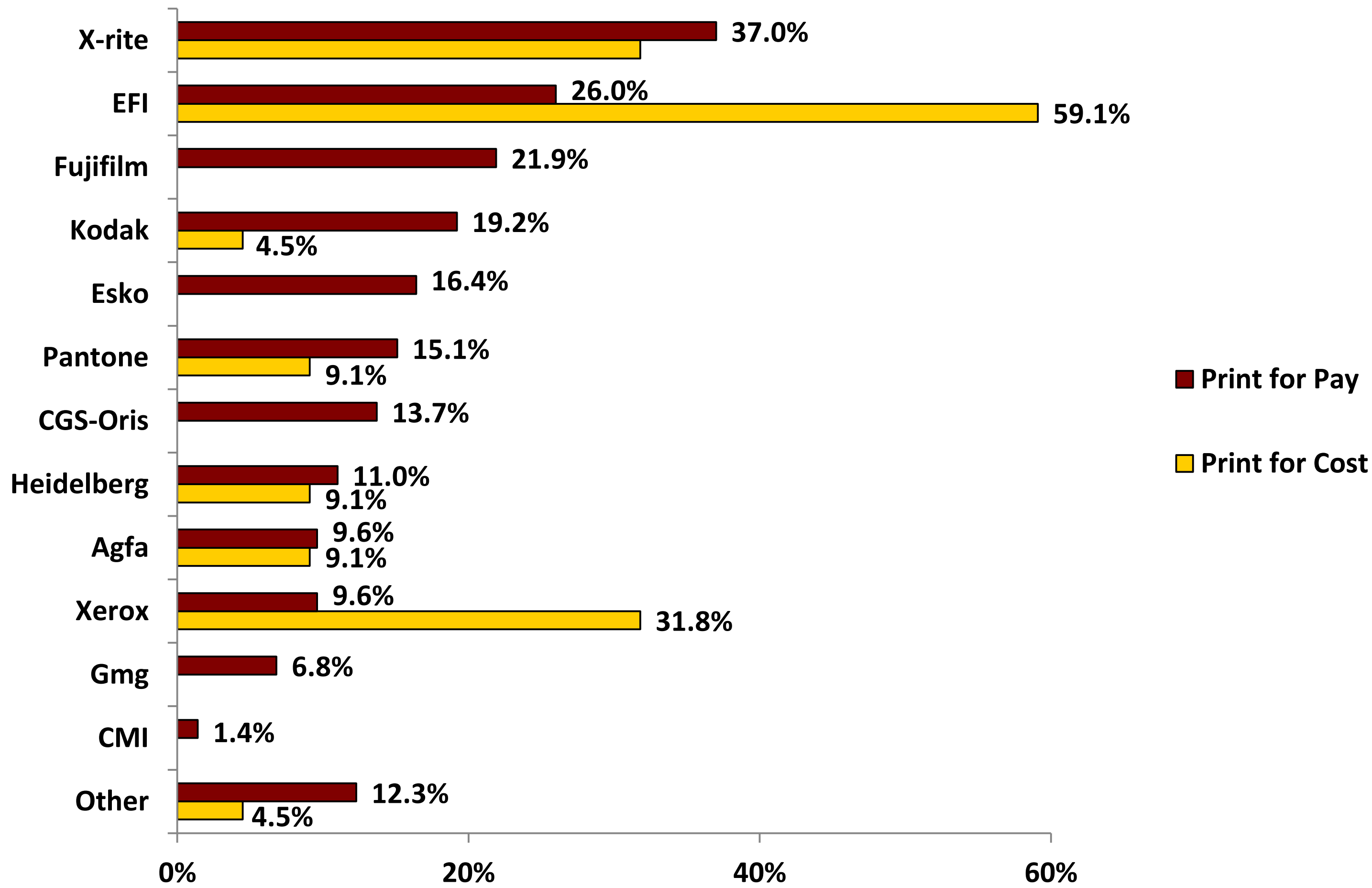


N = 95 respondents

Source: *Trends in Color Management Emerging Trends Research*, InfoTrends, 2015

Color Management Systems in Use

Q: What vendor supplies your Color Management System software that enables the creation and editing of ICC profiles?



N = 95 respondents

Source: *Trends in Color Management Emerging Trends Research*, InfoTrends, 2015

Recommendations for Print Service Providers

- **Print service providers who have not implemented color management are missing out on operational improvements**
- **Print service providers should look for opportunities to outsource certain color management tasks**
- **Consider the benefits of recent technology advancements in regards to color management hardware and software**

Color Management Summary

- **Investing in a systematic color management program can result in significant operational gains for print service providers**
  - Less rejected work and reprints are required, thus saving costs in labor and materials
  - The quality of work is improved, which keeps current clients satisfied and may open up opportunities to on-board additional color critical customers
- **Solutions must have ease of use and exploit all opportunities for automation**
- **Print service providers are looking to reduce the complexity and resources required to manage color**
  - Cloud-based software solutions coupled with in-line spectrophotometers offer new automation opportunities that were not previously possible
- **Budgets are tight for many providers, so vendors must provide cost effective solutions**
  - Subscription-based software could allow smaller print service providers the opportunity to purchase a color management system
  - Professional services could be tied to performance metrics after implementation instead of charging an upfront fee

Important Packaging Mega Trends

Customer Engagement

Desire to use innovative product packaging and digital technology to engage more directly with the consumer

Next-Gen Product Identification

Build capability beyond the GTIN and EAN/UPC bar code to meet consumer demands, regulatory requirements for additional product information, and higher security / anti-counterfeiting needs

Digitization of the Packaging Value Chain

Supply Chain Integration

BENEFITS

- **Faster time to market**
  - Shorter cycle times
  - Dig. Prototyping / Visualization
- **Lower Cost**
  - No obsolesce
  - Less waste
- **Better brand control**

Global Brand Management & Collaborative Working

Managing the exploding number of SKUs and brand versions, ensuring legal compliance, approval and brand control/consistency across various value chain stakeholders

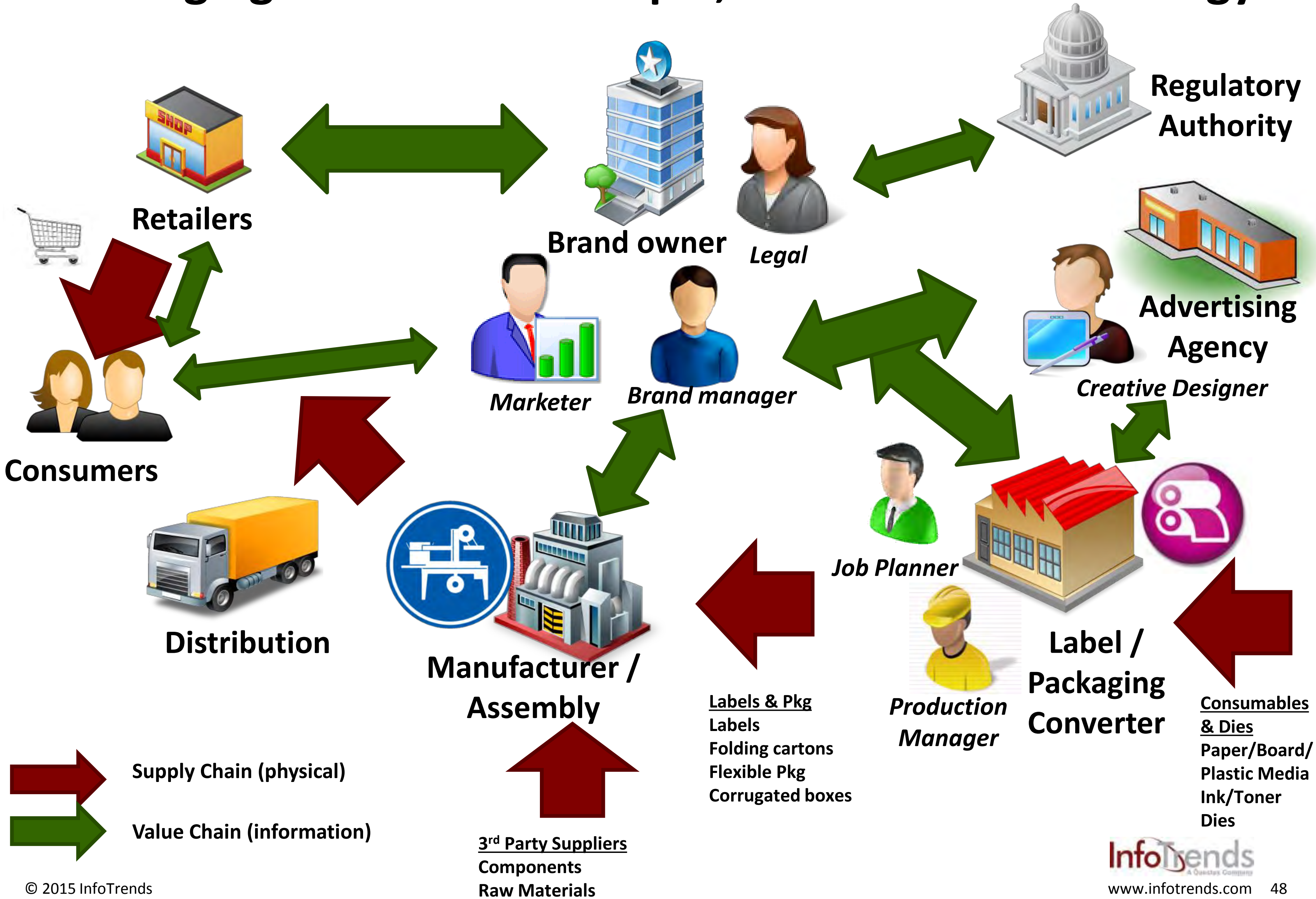
On Demand Production

Rise in digital production equipment for cost-effective short-run production

Supply Chain Transformation

Rapidly changing market demands require manufacturers to obtain responsive, agile, and real-time supply chains based on modern technologies such as cloud, mobility, and data analytics

Packaging Value Chain: People, Processes & Technology



Questions to Address with Future Research

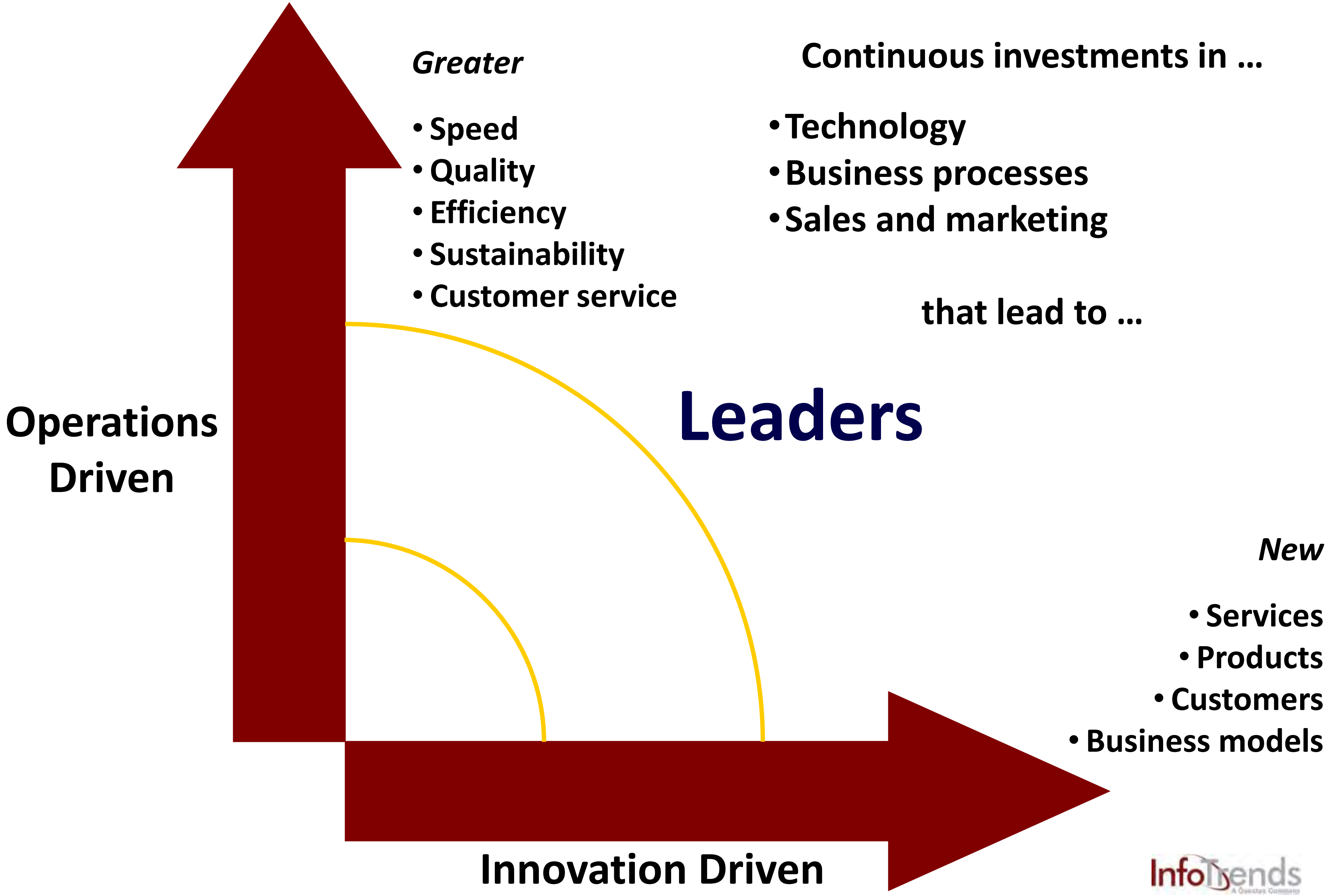
1. What does a digital packaging value chain look like?
2. Who are the key stakeholders?
3. What/who drives digital transformation & integration?
4. What are benefits, challenges and key pain points of a digital, integrated packaging value chain?
5. What is the current level of adoption?
6. What is the addressable market and market size per software segment and stakeholder group?
7. Who are key software players per segment and what is their relative share?

Conclusions and Recommendations

Conclusions

- Industry consolidation is a key driver behind print service providers' desire to automate and expand their business opportunities through value-added services
- Cloud and mobile technologies will shape the future of workflow
- Print service providers' spending on software is remarkably low
- Inkjet technologies are having an impact at higher levels of production and in a broader range of applications
- Challenges remain in implementing web to print and color management
- Packaging workflow for production digital print is the next frontier

Strategic Recommendation



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  - http://blog.infotrends.com/
    - Also video blogs about print samples of all types:
      - The Jim Hamilton YouTube channel – tinyurl.com/7rsyb9b
- **The Ultimate Guide to Digital Print (Hardware & Software)**
  - http://ultimateguide.infotrends.com

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