THE FUTURE OF “BIG DATA” and AGINFORMATICS
Adoption, Profitability & Economic Implications for AgInformatics Sector Stakeholders

Data has become a modern agricultural commodity. Investments in human and technological solutions for translating data into actionable information have exploded across the supply chain. These inevitable “AgInformatics” solutions will forever change the way we think about agriculture. In the last 24-36 months, agriculture has enjoyed a period in which technology advancements and farm profitability have begun to converge with the long promised value of AgInformatics. For 6 of the past 7 years, average market price has outperformed production costs. This was not the case in the prior decade. What will be the reaction of investors, users, and stakeholders of AgInformatics solutions should margins evaporate again? Who are the winners and losers? Where are the opportunities? In a boom and bust cycle, what are implications of short term down cycle for AgInformatics in 2020? Has information technology become “mission critical” across the supply chain or is it an expendable “luxury” which will fade with profitability? If the latter, uncertainty will curb investments and it could set the sector back a decade.

INFORMA ECONOMICS JOINS GEOSILOS
To Offer Study Exploring Economic Implications and Opportunities for AgInformatics

Informa Economics is a global leader in food agriculture and agribusiness research and analysis. Through its global network of analysts and consultants, Informa Economics is able to spot trends and devise strategies for firms up and down the agriculture vertical. In this regard, Informa Economics has conducted numerous studies and analysis of the application of technology and use of data to make better decisions within agriculture.

What is “Big Data” and “AgInformatics”

Big data refers to the ability to collect and analyze the vast amounts of data now being generated worldwide. Every day the world generates 2.5 quintillion bytes of data. These data are generated everywhere; supermarket scanners, weather sensing equipment, digital pictures and video, and of course, casual media are just a few of the areas that generate “Big Data.” Big Data in the context of agriculture refers to new means of collecting and analyzing data generated from the farm to the end consumer. But how should this data be used? And, who owns it? Is the investment required to generate and analyze the data worth it? What is the return and who benefits? And, if we are moving into a new low price environment, is “Big Data” a necessary competitive advantage or a luxury that does not have an adequate rate of return? For the purposes of this study, we will refer to the agriculture application of “Big Data” or AgInformatics.

GeoSilos heralds data as the “modern agricultural commodity” and specializes in leveraging place based approaches to transform this modern commodity into actionable information. A key mission of the firm is to support spatial analytics as a tool to translate data into decisions in business, economic, and policy applications across the food and agriculture value chain. GeoSilos is not alone in the recognition of this modern commodity. Across the sector, farms and firms are making tremendous investments in the “AgInformatics” sector with the objective of growing data into dollars.

We jointly recognize that the elevated prices of recent years and relatively large margins at the producer level might not be
sustainable in the long run. While a return to the very low margin levels of the 1980s and 1990s is not expected, some moderation in prices and margins is not unlikely. How will this change attitudes on the farm and throughout agriculture with respect to investment in new technologies, particularly with respect to “Big Data” and AgInformatics?

GeoSilos and Informa Economics will work together in this exciting new area of AgInformatics and develop concepts and conclusions that will help guide future application of these technologies. Specifically, the project team described in this multi-client prospectus will examine in detail the economics of this area and reach conclusions with respect to the future of these technologies if agriculture enters a new period of lower margins and lower return on investment. It is important to note that this study is not predicting an era of lower margins and prices. Rather, this is viewed as one possible scenario that needs to be considered and the impact of this scenario on AgInformatics needs to be examined.

AGINFOMATICS COMES OF AGE

Deere Co., Dow AgroSciences, Monsanto, Pioneer, Syngenta, Valmont Industries and many others across the supply chain are on the verge of going “all in” on data collection, analysis and operational planning. For these firms, investments range from massive “Big Data” efforts for internal research, development and marketing purposes to producer focused solutions. Deere, for example, has pioneered equipment telematics solutions enabling farms, service providers and company engineers to know where equipment is, how well it is operating, and proactively schedule maintenance and ship parts. Beyond iron, Deere and Syngenta offer solutions which integrate weather, sensors, telematics, and informatics to manage water. Last year, Monsanto purchased an equipment firm, Precision Planting, to better integrate seed, inputs, and planting equipment and drive a big data feedback loop to analysts. In the lab, firms are analyzing field data feedback against their own research to compare the research plot with the realities of production.

Hundreds of firms in the precision agriculture marketplace have spent decades developing and marketing data collection hardware, software, and analytics. Because of rapidly changing technology, low cost processing capacity, and ubiquitous internet connectivity, new entities are emerging which focus exclusively on data mining, benchmarking, and analytics. Farms, both large and small, are looking to squeeze decisions from data, streamline operations, and maximize profits. Analysis has moved beyond yield maps to profit and loss strategies by the foot. These strategies are translated to the field through high precision guidance and real-time sensors which can customize planting location, distance, and depth or deliver inputs by location and amount. A growing effort to encourage producers to share this data would enable production and financial benchmarking across farms for metrics such as yield by soil, hybrid or region and allow for comparison against peers. With scale, this same information can be used by economic firms struggling with uncertainty in the supply and demand domain to have a better understanding of planting intentions, progress, quality, and beyond.

Perhaps the original king of Big Data in agriculture has been the agri-marketing sector. Deep databases of farms, livestock, crops, purchasing habits, and demographic information has enabled precision market segmentation and message targeting. With expanding internet use, data capture rates are increasing and segmentation improving. Pick up any popular trade journal such
as *Top Producer*, *Farm Journal*, and *Farm Futures* today and there are numerous articles discussing issues surrounding “data.” The same publications are featuring advertisements valued in the tens, if not hundreds, of thousands of dollars for these enabling technologies each month. From iron to informatics, the industry is potentially spending hundreds of millions in this emerging field annually. Venture capital and investment firms struggle with predictions of winners and losers in this space but clearly see financial opportunity and want to know where these dollars will be invested.

**CAN AGINFORMATICS SURVIVE $4.50 CORN?**

In the last 24-36 months, agriculture has enjoyed a period in which technology advancements and farm profitability have begun to converge with the long promised value of AgInformatics. Consider the economics of corn production. Forty-year averages for corn margins are $0.09. For the period 1997-2006, the season average market price for corn was below the cost of production 9 of those 10 years. Yet, for 6 of the past 7 years, average market price has outperformed production costs. Some research firms predict corn farm prices in the high $4 range and net returns per acre in the $450 range through 2022. Perhaps this prediction is overly bearish, but how does the industry convince producers (at varying sizes) to adopt and pay for new-age technologies as US agriculture returns to $0.50 or lower corn margins as production costs continue to rise? What are the implications for the AgInformatics sector as we return to means for commodity margins in the grains markets from farm to firm? Is farm technology adoption curtailed? Is firm investment scaled back due to uncertainty? Are higher margin production sectors spared? Or can the sector “convince” producers that data is the modern agricultural commodity and that the investments are necessary to maintain competitive advantage?

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1 [http://www.agweb.com/article/the_bottom_line_opportunity_knocks](http://www.agweb.com/article/the_bottom_line_opportunity_knocks)
KEY QUESTIONS

Each of these questions may be posed within segments of the supply chain as well as along the scale of farm size for producers.

- What is AgInformatics and how is it used across the industry? What is the value proposition for AgInformatics across the value chain? Has information technology become “mission critical” across the supply chain or is it an expendable “luxury” which will fade with profitability?
  - If considering the former, which technologies (like guidance) are mission critical and which are disposable luxuries (such as marketing or crop imaging?)
  - With $0.50 margins on corn, would producers give up biotech? Hardly. The answer is not so clear for AgInformatics.
  - Will producer expectations shift such that AgInformatics are an expected part of the product offering and included in price?
  - If the latter, it could set much of the sector back a decade.

- What are the long and short-term projections for operating margins and profitability in the commodity production sector? What about other production sectors such as cotton, sugar, or orchards and viticulture?
  - If margins will remain high, the concern is much ado about nothing and the market will explode.
  - Where are the opportunities?
  - As margins recede and purchase decisions become trade-offs, some market segments will be in a more desirable position than others.
  - Where are the opportunities?
  - If margins fade, only to return after a short cycle, what strategies should the informatics sector put in place to weather the storm?
  - Where are the opportunities?

- What are the elasticity of demand and price response functions across the supply chain for technology goods and services?
  - Who will forgo technology investments? In what market segment? At what price?
  - Technology costs will likely decrease, but the human capital requirements remain high while increasingly automated solutions are developed. Is critical mass through farm consolidation or firm mergers and acquisitions necessary for long-term success?

- What are the economic implications (empirically) of the “big data” revolution?
  - Will the commercialization of data change in the future?
  - Can data value be monetized (more refined) and traded?
  - What are the next data marketplaces in agriculture, food and other industries?

IMPACTED MARKET SEGMENTS AND POTENTIAL CLIENTS

This multi-client study initially focuses on the agricultural commodities production sector. However, clear and broad implications exist for farms, agribusinesses, food and beverage industry, and other stakeholders across the food and agriculture space. Clearly, these concepts
could be broadened to include additional sectors or segmented to focus on discrete verticals based on size and or scope. Appropriately, each potential study participant asks “what’s in it for me?” This study is a “groundbreaker” and it will set the stage for strategy and tactics that are “in flux” today. This still will assist each participating entity to build its focused strategy on a fact-based foundation not just speculation of a dynamic value chain adjustment.

### DRAFT OUTLINE OF A MULTI-CLIENT STUDY

This outline will be enhanced, post the pre-study conference call/webinar by “select” input from subscribers.

1. **Foreword**
2. **Executive Summary**
3. **Introduction**
4. **The Evolution of AgInformatics**
   A. What is Informatics in Agriculture?
   B. AgInformatics Sector Value Chain Profile
   C. Key Drivers of Success for Informatics in Food and Agriculture
      i. Hardware and Software
      ii. Telecommunications and Information Infrastructure
      iii. Markets, Finance, and Capital
      iv. Human Resources
      v. Policy, Regulatory, and Compliance
      vi. Consumer Expectations
   D. Key Barriers for Informatics in Food and Agriculture
      i. Technological and Engineering
      ii. Economics
      iii. Privacy and Security
      iv. Value Perceptions
      v. ROI
   E. AgInformatics in 2020, a Look Ahead
V. Short and Long Term Production Margin and Farm Profitability Analysis
VI. Select Profitability Scenarios and Sector Implications for 3, 5, and 10 Year Cycles
VII. Economic Implications for AgInformatics Adoption, Purchasing, Sector Growth and Consolidation
VIII. Sector Opportunities
IX. Summary Observations

STUDY TEAM

Informa’s Memphis consulting group will conduct this study, with Juan Sacoto, Senior Vice President, as the co-project leader and representing GeoSilos as co-project leader is Matt Bechdol, Founder and President of GeoSilos. Project reviewers for the study are Dr. Bruce Scherr, Chairman and CEO and Tom Scott, President and COO of Informa Economics, Inc. Biographies of the team members can be found at the end of this document along with background on Informa Economics and GeoSilos. The project team will engage select academic and industry specialists as well for various topics.

DRAFT DELIVERABLES

- Multi-Client Pre-Study Conference Call/Webinar
  - Initial customer discussions will shape key questions
- Multi-Client Executive Interviews
- Multi-Client Study Release
- Multi-Client Group Seminar
- Individual Client Seminars

STUDY COST

The fees for the study are $15,000 for Informa Economics/GeoSilos clients and $18,000 for non-clients. The above fees include the pre-study web-based conference and the client group review seminar. Presentations at client's offices by Informa and GeoSilos staff are optional with a separate fee as noted above. Informa will bill half of the study fee upon the “kick-off of the study” and half when the report is provided. Participation in the study is accomplished by completing the enrollment form in this brochure and returning a signed copy to Informa.
ENROLLMENT FORM

☐ Yes, I want to participate in the multi-client study, “The Future of “Big Data” and AgInformatics. The cost of the study is $15,000 for clients and $18,000 for non-clients. One-half of the study fees will be billed upon initiation of the study, and the remaining half will be billed upon delivery of the final report.

☐ Please have someone contact me to provide further information.

Name: ___________________________ Signature: ___________________________
Title: _____________________________
Company: __________________________________________
Street Address: _______________________________________
City, State, ZIP: ____________________________
Telephone: ___________________________ Fax: ___________________________
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BIOGRAPHIES OF STUDY TEAM

Bruce A. Scherr, Chairman of the Board and Chief Executive Officer. Dr. Scherr has been with Informa Economics, Inc. (formerly Sparks Companies, Inc.) since 1987 in several executive capacities including President and CEO. In addition, he was an Advisor for Metalmark Capital LLC, a private equity fund. Formerly he was president of Sparks, Jacobs, Scherr, Inc. (SJS), a sister company to Sparks, and president of Agri-Commodities, Inc., an agriculture consulting firm based in Andover, Massachusetts, which was acquired by SJS. Prior to forming Agri-Commodities, Dr. Scherr was a divisional vice president at Data Resources, Inc., where he developed and utilized for the public and private sectors the first commercially available econometric model for US agriculture. Dr. Scherr received his bachelor's degree from Rutgers University and his master's degree and doctorate from Purdue University, all in agricultural economics. Currently, he is a member of the Board of Trustees of the North American Electric Reliability Corporation; E. Ritter & Company; Santa Energy Company; and Chairman of the Board of Legumex Walker, Inc. In addition, he served as a member of the Global Strategy Institute Advisory Council of the Center for Strategic and International Studies; as a member of the Board of Directors for Desert STAR Inc., an electrical transmission Independent System Operator for the Desert Southwest from January 2000 through February 2002; and as a member of The University of Tennessee’s (UT) Institute of Agriculture Agricultural Development Board and UT’s Committee for the Future. He was named a 2007 Distinguished Agriculture Alumni from Purdue University and he is a member of several honorary research and agricultural societies, a member of the National FFA Foundation Sponsors’ Board 2000 through 2001 and a former advisor to the President’s Council of Economic Advisers and National Aeronautics and Space Administration.

Thomas P. Scott, President and Chief Operating Officer. Mr. Scott has been with Informa since 1989. Mr. Scott's specialized work has included business strategy, agribusiness economic development, feasibility and site selection work, as well as various market analyses. In addition to his work in North America, Mr. Scott has extensive experience in the agribusiness sectors of Central Europe, Southeast Asia and South America. He has been involved in many training programs developed and delivered by Informa Economics. Prior to joining the company, he had various assignments in management, trading, logistics and merchandising with Continental Grain Company. He received his bachelor's degree in agricultural economics and business from Cornell University and a master's degree in business administration from the Amos Tuck School of Business Administration at Dartmouth College where he was an Amos Tuck Scholar.

Juan E. Sacoto, Senior Vice President. With Informa Economics since 1997, Mr. Sacoto is the Leader of Informa’s Project Consulting Group. Mr. Sacoto has extensive experience in a wide range of management consulting services across most segments of the global agricultural and food supply chain and related supply chains such as renewable fuels and logistics, among others. Mr. Sacoto’s experience and on-work often involves business strategy, risk management, market research, feasibility evaluation, financial and competitive analyses, economic modeling and forecasting, economic development, economic impact, merger and acquisition (M&A) due-diligence work, and related management consulting work. Mr. Sacoto has knowledge and experience analyzing many segments of the agriculture and food supply chain including: fertilizer production, seed, farm equipment manufacturing, crop and livestock production economics, sugar refining, grain storage and merchandising, grain and oilseed processing, sugar
manufacturing, meat processing, vegetable oils, aquaculture, farmland economics, animal rendering, ethanol and biodiesel, pet food manufacturing, transportation infrastructure, and food consumption, among others. He also has extensive practical experience evaluating agribusinesses across several regions, including the US, Canada, Mexico, Brazil, Argentina, the EU, Mexico, China, Japan, Korea, Ukraine, Russia, and Southeast Africa. He is fluent in Spanish and has broad cross-cultural training. Prior to joining the company, he worked as a financial and equity analyst. He received his bachelor's degree in finance from Jacksonville State University and his master's in international business administration from The University of Memphis.

Matt Bechdol, President of GeoSilos. GeoSilos is a consulting firm focused on leveraging place based solutions for food and agriculture challenges. For fifteen years, Mr. Bechdol has specialized in applications of spatial analysis and remote sensing for agriculture and natural resources. He began his career as a consultant at NASA investigating imaging, wireless, and GIS technologies for precision agriculture. He then spent a decade at ESRI, the world leading geographic information system software firm. There he managed a team supporting USDA’s geospatial technology and business integrations to solve agricultural problems from precision farming to global crop forecasting. He also teaches continuing education courses at George Mason University’s GIS Certificate Program in Manassas, Virginia and lives with his family on the farm’s original 1864 Indiana homestead. Mr. Bechdol received his bachelor’s degree in public affairs from Indiana University, a master’s degree in geographic and cartographic science from George Mason University, a master’s degree in agricultural economics from Purdue University, and a master’s in business administration from Indiana University.

Scott A. Richman, Senior Vice President, Consulting. With Informa Economics since 1991, Mr. Richman provides a full range of management consulting services to clients in the agriculture/food, renewable fuels and conventional energy industries, as well as related trade associations and government agencies. He has extensive experience writing business plans, conducting feasibility studies and economic impact analyses, constructing financial statements, developing strategic plans and analyzing and forecasting markets. He is a recognized expert on ethanol and has led a number of consulting assignments regarding agricultural biotechnology. He also has served as an expert witness and has provided supporting analysis for legal proceedings. Along with work throughout the United States and Canada, he has conducted consulting projects in Mexico, Western Europe and Poland. He has delivered presentations to a number of conferences, including USDA’s Agricultural Outlook Forum, the Renewable Fuels Association’s National Ethanol Conference, and the World Ethanol and Biofuels Conference. In addition to his experience at Informa, Mr. Richman spent one year at Hart Energy as Executive Director, Global Biofuels and Agriculture. Mr. Richman received his bachelor's degree in economics from Vanderbilt University and his master's degree in international affairs at Columbia University, where he specialized in international business and was an Honorary International Fellow.

J. Stephen Harris, Senior Consultant. Mr. Harris' primary responsibilities within the company's Project Consulting Group include research and analyses for international and domestic consulting clients, with particular emphasis in financial business analysis. Mr. Harris came to the company from Accuship Inc., where he worked with multi-national clients on freight and logistics and, for the 10 years prior, was the owner/operator of Fleet Feet Sports, both in Memphis. Before this work, he spent seven years as a senior financial analyst with Federal Express Corporation where he managed the information and telecommunications division's
financial planning and served as the lead financial analyst of the company's Memphis-based budget planning process. He also was the manager of investor relations at Bright, Poag and Thomason, Inc., and a project engineer for PSI Process Systems, Inc., both in Memphis. Mr. Harris received his bachelor's degree in chemical engineering from Vanderbilt University and his master's degree in business administration from Memphis State University.

**Crystal L. Carpenter, Senior Consultant.** Ms. Carpenter is a senior consultant within Informa's Project Consulting Group where her primary responsibilities are research and analyses in support of projects for a range of consulting clients, including those involving the development of second generation biofuel feedstocks such as jatropha, camelina, algae, miscanthus, and sweet sorghum. Other areas of work have included oilseed processing, renewable fuels, animal feed and distillers dried grains industry analysis, and econometric modeling. Prior to joining the company, Ms. Carpenter was a graduate research assistant at Michigan State University where she developed a non-linear mathematical simulation model that identified optimal distillers grain inclusion rates into beef feedlot rations. She also previously conducted research on topics including trade flows of edible beans in Central American countries; vertical integration within the beef industry; the use of satellite imagery in conservation management strategies; and Montana's beef trade with Russia and China. She received her bachelor's degrees in agricultural economics and Spanish with a minor in public relations from the University of Idaho and her master's degree in agricultural economics from Michigan State University.

**Riley Higby, Consultant.** Mr. Higby is a member of Informa Economics' Project Consulting Group, with responsibilities for economic impact analysis, financial analysis and market research. Prior to joining Informa Economics, Mr. Higby was a management consultant with Lookout Ridge Consulting, formerly Salisbury Management Services, in its Pacific Northwest office. At Lookout Ridge Consulting, he specialized in consulting roles that included financial analysis, succession planning, and management consulting for agri-business and production agricultural operations. Mr. Higby grew up on a commercial cattle operation in western Idaho. He earned his bachelor's and master's degrees in agricultural economics with a minor in accounting at the University of Idaho. While at the University of Idaho, Mr. Higby was an intern with the Livestock Marketing Information Center, studying cow-calf economics and management information systems. Mr. Higby's graduate level thesis focused on an economic analysis of Pacific Northwest apple production as well as the impact of specific management practices.

**Chen Liu, Consultant.** Mr. Liu joined Informa Economics, Inc., as a consultant within the business consulting group in January 2011. His primary responsibilities are to obtain market intelligence by research and analysis of the US and global primary and secondary markets of food, agriculture and renewable energy and to provide support to various feasibility projects, market outlooks, economic impact analyses, competitiveness analyses and site selection. His areas of work include economic and quantitative analyses of the oilseed processing industry, grain and animal feed markets, sugar and byproduct industry, renewable fuel industry, agricultural logistics system and infrastructure, biotechnological research and development, and the pet food industry, among others. Also, Mr. Liu is responsible for the Market Intelligence and Mapping Services of the company and develops and/or maintains various industry databases. Prior to joining Informa Economics, Mr. Liu was a graduate research assistant at Purdue
University, analyzing interrelationships and fluctuations of commodity prices and exchange rates. Before attending graduate school, Mr. Liu interned in the Corporate and Investment Banking Division of Citibank (China) Co. Ltd. as an investment analyst and in the Marketing and Sales Division of SYWG BNP Paribas Asset Management Co., Ltd. as a financial representative. Mr. Liu received his bachelor's degree in finance with high distinction from Beijing Normal University and received his master's degree in agricultural economics from Purdue University. Mr. Liu's native language is Chinese.

**Chris T. Rutland, Consultant.** Mr. Rutland is a consultant in Informa Economics’ Project Consulting group. Before coming to Informa, he was a research assistant in the Agricultural and Food Policy Center (AFPC) and a teaching assistant in the Department of Agricultural Economics, both at Texas A&M University. During his time at Texas A&M, he built a spreadsheet model to estimate greenhouse gas emissions from AFPC’s representative farms. Mr. Rutland also interned with the University of Georgia’s Department of Agricultural and Applied Economics, where he compiled and analyzed cotton quality data for Georgia’s cotton gins. Mr. Rutland received his bachelor’s degree in agribusiness from the University of Georgia and his master’s degree in agricultural economics from Texas A&M University.

**ABOUT INFORMA ECONOMICS**

Informa Economics, Inc. (Informa) is the world leader in broad-based domestic and international agricultural and commodity/product market research, analysis, evaluation and consulting. Informa serves hundreds of firms, institutions and trade organizations worldwide from our headquarters in Memphis, Tennessee. Informa also maintains offices in McLean VA, St Paul MN, Winnipeg MB (Canada), São Paulo (Informa Economics-FNP), London and Brussels (Agra CEAS) and Washington DC (WPA).

Informa’s broad categories of services include:

- Management Consulting for Agribusiness;
- Commodity Market Analysis and Evaluation (Agriculture and Energy);
- Risk Management Strategies;
- Education and Training;
- Newsletters and Other Publications; and
- Transportation, Industrials and Energy Market Analysis.

The company’s professional depth and experience allow us to provide a wide range of services related to the economic and management concerns of clients, as well as to focus on broader issues concerning markets, facilities, resources and many others. In addition, Informa Economics is a world leader in the collection, analysis, and dissemination of agriculture and food information.

The Informa team has also has extensive experience in agricultural policy analysis, especially since many employees formerly held senior policy, analysis or advisory positions in government; worked for major trade associations; held positions in land grant universities; or held senior
management positions in leading agribusiness companies; most hold advanced degrees in agricultural economics or related fields. (For more information on Informa Economics, its staff and the services it provides see www.informaeccon.com)

ABOUT GEOSILOS

GeoSilos is a strategic consulting firm based in Auburn, Indiana, which leverages the power of place based solutions for food & agriculture challenges. GeoSilos supports business, economics, policy, communications and outreach analysis built upon the foundation of geography and spatial analysis and is committed to a healthy, growing, and sustainable global food and agricultural industry. GeoSilos heralds data as the modern agricultural commodity for the industry and recognizes the special value of place in transforming data as a raw commodity into actionable information. A key mission of the firm is to shift how the food and agriculture industry thinks about and integrates geography and spatial analysis. The firm supports organizations across the food and agriculture value chain with the following place based services portfolio:

- Strategic Planning: Business Requirements, Architecture & Design, and Implementation;
- Strategic Analysis: Economics, Policy and Statistics, and Spatial Modeling;
- Strategic Outreach & Communication: Digital and Paper Cartography, Social Media, and Web Mapping Content Development