**Promotion Optimization – Year End Accomplishments - 2020**

**Note: Priorities are in black bullets and Accomplishments are in maroon text under the corresponding priorities.**

**Tag <new> represents new project this year. Team member names are also tagged next to projects.**

**INNOVATION Priorities:**

* Inform the planning, execution and evaluation of DET campaigns
  + Campaign forecasting design tool - Build simulation framework for DET campaigns to determine probability of various success parameters (ROI, sales volume) while planning for campaigns.
* A prototype for G9 Adolescents campaign was designed and delivered. Scenarios inform 2021 HCP non-personal promotions allocations **[~$10MM]** by segment, vendor & channel. <Senthil> <new>
* The tool is being enhanced with help from Datazymes. <Senthil> <new>
* **P**roactively provide new insights & recommendations to drive **incremental revenue**, with a particular focus on DETs, Vaccines & Oncology, and New Products
  + Coupon / Evoucher design evaluations & IPF optimization: Reduce implementation time and produce consistent results through tools development
* Developed Excel/R tool to automate copay design studies for national and state-based copay programs. Significant time savings in copay analysis enabled <Dave, Datazymes> <new>
* To develop IPF Optimization tool next year. On hold due to resource constraints.
  + Research and develop a framework to study sales impact of promotions at tumor level for Keytruda.
  + Several models to investigate personal and non-personal promotion impacts using Keytruda claims data were studied for Lung, Melonoma+H&N tumors. <Arun><new>
  + Research suggests that claims data at HCP level is ok for Personal promotions but for non-personal promotions a higher-level aggregation (zip3) is needed.
  + Develop portfolio budget allocation framework for Keytruda
  + Successfully completed the development of DOMINO tool to provide budget allocations for Keytruda. First round of 2021 tumor and high-level budgets **(approx. $450MM to $550MM)** were largely guided by DOMINO process. <Blythe, Senthil> <new>
  + Key analytical contribution includes a flexible fuzzy scoring method that is easy to expand as business requirements constantly changed.
  + Project DOMINO required coordination among many Merck teams and consulting companies as well as getting buy-in from MLT. <Blythe, Senthil> <new>
  + Incorporated impactable new patient start methodology into other KEYTRUDA projects to help tumor prioritization and staffing. <Blythe> <new>
  + Expand data and methods to evaluate DET campaigns
  + On-boarded four vendors to enhance HCP non-personal promo data in CIRRUS. <Blythe>
  + Worked with DET and Solved to establish templates and SOPs to receive accurate promotional data and spend <Blythe><new>
* Improve “**Data & Analytics Operating Model**”
  + Develop HCP & HCC Grail like analytical data sets to improve execution time for Mkt. Mix models.
  + HCP non-personal grail like dataset for Market Mix models have been developed. <Blythe, DZ> <new>
  + Working with Datazymes to automate media pull from Google platform directly and reduce the HCC data pre-processing time for Marketing mix <Ambika, DZ> <new>
* Other Innovation projects
  + Develop Digital Advertising Simulation System (DASS) to study the accuracy of various HCC attribution models.
  + Implemented Google’s paper to develop DASS for modelling digital advertising and its impact on user behavior. <Arun><new>
  + Results showed that all leading rule-based attribution models failed to capture true causal value of advertising.
  + Determine optimal Cost per Click for paid search campaigns.
  + Developed a model to determine optimal cost per click ceilings for different Paid Search campaigns based on multiple ROI scenarios. Future cost savings in real time bidding of keywords is expected. <Arun>
  + Support coupon designs for launch brand.
  + Constructed a new baseline based on Merck’s financial claims forecast when there is no copay program in place to measure impact of proposed copay designs – for the Vericiguat Launch. <Dave><new>

**CORE SERVICES Priorities:**

* Focus on evolving analytics services for DETs, Vaccine, Oncology, CC/WH and Hospital/Specialty business units.
  + Expand Mkt. Mix and HCP/HCC promotion impact & ROI work streams:
    1. Keytruda(2X), Gardasil (2X), Nexplanon, Belsomra, Januvia, Steglatro, P23, Lynparza (new), Lenvima (new), Bridion, Zerbaxa
       - **Completed Mkt. Mix (HCP & HCC) for Keytruda (2X), Gardasil Adolescents, Gardasil Adults (new), Nexplanon, Belsomra, Januvia, Steglatro and P23 <Team, DZ, ZS>**
* General class of Mkt. Mix results informed several promotion investments worth a total of ***>$600MM.***
* Keytruda: On AVPs request, optimized HCP reach & frequency by segment and channel to allocate additional funds. <Blythe>
* Studied COVID’s impact to incremental revenues from personal and non-personal promotions for multiple brands (Januvia, Steglatro, Gardasil, Pneumovax, Belsomra, Nexplanon), with focus on performance of phone calls and online meetings compared to live rep calls. **This has a high potential impact and will help inform sales force strategy for 2021**. <Blythe, Senthil, Ambika, ZS>
  + - * Guided about $5MM 2021 **LYNPARZA DTC campaign** fund allocations through Mkt. Mix. analysis of channel level ROIs of 2019 HCC campaigns. <Arun><new>
      * Mkt. Mix. Analysis expanded to Pediatric vaccines Rotateq, Proquad and Varivax for the first time <Ambika, DZ><new>
  + Expand DET campaign evaluations: Gardasil, Dificid, Steglatro
  + Analyzed Gardasil Wave 1 & 2 DET campaigns and measured an impact of about $20MM+ due to DET activities alone. <Ambika, DZ>
  + Analyzed three waves of DET campaigns for Dificid (Intent, Consideration, Fast Start) with a return of <$10MM from all DET non-personal promotions. <Arun, DZ>
  + Optimize promotional budget allocations for 2021 through IPF:
    - * Keytruda
* Determined impact of HCP promotions and digital promotions on Keytruda sales. <Ambika, Blythe, Senthil, ZS>
* Guided **$150MM+** HCC optimal investment scenarios for 2021. <Ambika>
  + - * Gardasil, Nexplanon, Belsomra, Januvia, Steglatro , P23
      * Analyzed and recommended optimal 2021 budgets **(~$300MM)** for above listed brands. <Ambika (lead), Tracie, Senthil, DZ>
      * Business Unit level budget allocations
      * Recommended allocation within/across business units (Primary Care &Women’s Health, Specialty) through scoring models and communicated the results to the BU leaders & Finance team <Ambika>
  + Coupon/Evoucher design and performance evaluations for Januvia, Steglatro, Belsomra, Verciguat, HIV:
    - * Worked with marketing, operations and Finance to produce copay design studies. Analysis include: <Dave>

Steglatro Family 2020 Quantity EV Copay Design

Prevymis EV State Analysis

Gefapixant Benefit Study

Vericiguat 2021 offer design (IQVIA guidance + Independent analysis)

IQVIA Abandonment/Adherence Study for 5 Markets

* + Support Crossix HCC media analysis, New cost saving HCC media targeting proposals, and HCC brand strategy:
    - * Keytruda, Gardasil, Nexplanon, Belsomra, Januvia, Steglatro, P23, Lynparza
* Keytruda & Gardasil: Net Impact analysis – Worked with Crossix & INI to calculate revenue and cost efficiency across different channels / publishers / vendors. <Ambika>
* Keytruda: Evaluated Crossix POC measurement methodology and suggested changes for accurate measurement <Ambika>
* Belsomra and Pneumovax: Calculated cost efficiency based on Net impact analysis from Crossix. Worked with INI, Crossix, media team, and brand team to provide investment recommendations for 2021 based on marketing mix and Crossix net impact analysis. <Ambika>
* Diabetes, Nexplanon, Lynparza: Worked with crossix to determine ROI at publisher, segment and targeting tactics leveland paid search campaigns. Guided brand and media teams on DTC channel mix for 2021. <Arun>
  + Others:
    1. Keytruda CIA models, Adhoc HCP/HCC Pilots, PRCs, HCC In-office evaluations, Adherence programs, Scoring models

Keytruda Pilot: Determined preferred geographies for running certain targeted campaigns (TNBC Social and Melanoma Display). Helped the Melanoma team measure the impact of 2019 Melanoma Display campaign <Ambika, DZ>

Keytruda Adhoc analysis – with high visibility and **>$200MM impact** – <Ambika>

* + - TV business case – Helped the brand team to prepare a **$80MM** business case for relaunching TV. **Results informed the decisions by Executive Leadership**
    - Impact of new media buying approach – Looked at early indicators of performance for new media buying pilot (NWOW) to provide recommendation for Lung & MB launch
    - Master Brand impact projections – Projected revenue and NPS impact for **$100M Masterbrand investment**
    - MSI-H additional budget – Assessed the impact of additional investment on ROI

Gardasil: Analyzed the correlation between revenue and awareness for G9 Adolescent <Ambika>

Gardasil: Analyzed contribution of WH Salesforce to G9 Adult sales and proposed steps to mitigate the impact of removing it <Ambika>

Supported the Januvia team with different LOE scenarios estimating change in return as the LOE approaches <Ambika>

Estimated the revenue impact of pausing FB for Q2’2020 and 2021 across Merck portfolio. **This informed senior & executive leadership decisions.** <Ambika>

Keytruda: Supported KEYTRUDA ICE team and brand teams in allocation of **$44MM HCP media**, medical education and MMF budget for 2021 across indications, HCP promotion channels and vendors using Channel Investment Allocation model. <Blythe>

Keytruda: Provided Customer Engagement Managers analytical support regarding testing designs, adhoc impact analyses, interpretation of impactable revenue and ROI, optimal budget discussions, etc. including Banner impact analysis, NBE, Crossix HPC promo measurement and 81QD digital segmentation. <Blythe>

MMF Analytics: Supported Datazymes consultant in impact and ROI analysis of 2019 MMF program attendance. Researched MMF data changes.<Blythe>

Collaborated with Agile HCP DnA team to determine ideal, future state for channel, sub-channel and user action mappings of non-personal promotion. <Blythe>

Participated in “Run the Business” meetings to understand improvements, changes and data issues in non-personal data and communicate them to larger MA&IO team. <Blythe>

Nexplanon: Support their first TV campaign in 2021 with about **$10M** spend by creating multiple ROIs scenarios based on variations in campaign design. <Arun>

* + Developed Vaccine/Specialty Promotion Response Curves (PRC) <Dave>
* Continue to provide analytical insights and guidance to support the successful deployment & scaling of the NBE capability.
  + Diabetes, Gardasil, Keytruda, P23

Consulted with DCSE and Brand teams on initiating new NBE’s for several products like Pneumovax, Bridion, Ped Vaccines, Zerbaxa, Keytruda indications etc. <Senthil>

Provided PNEUMOVAX\_23 brand team and DET with inputs needed to train NBE model launching in early 2021 including sales impacts by vendor and channel and maximum touchpoints by segment. <Blythe>

Gardasil: Provided analytics support to the G9 NBE team for max touchpoints, calculation of CEI, and evaluation of modeling and UAT results <Ambika>

* Identify and implement a new sourcing model for MMM work to increase frequency of updates and free-up analytic capacity.
  + Evaluate staffing model & tools to accommodate two sets of marketing mix models for major brands such as Keytruda, Gardasil
  + Vendor support was actively sought to complete various analytical requests:
    - * ZS: Keytruda Mkt Mix (2x), COVID Impact, NBE consultations
      * Datazymes: Several Mkt Mix and routine analysis, Coupon and Campaign planning Tool developments
      * Quantzig: Zerbaxa Mkt Mix (new vendor capability assessment)
      * One of our summer intern (Alex) ***researched interpretable ML tool as an alternative model here and has shown a good future promise.*** Has developed a R tool to automate a large portion of this research so that others in the group could start to use the research tool.

**COE DEVELOPMENT Priorities:**

* Reshuffle some of the staff responsibilities so as to encourage learnings and distribute the knowledge base. Ex: HCC & NBE responsibilities distributed among team members.
* HCC and HCP responsibilities were reshuffled extensively particularly after Yan left the team.
* Ambika, Tracie and Arun have adapted to the new HCC responsibilities very well and even under tight resource constraints, we are able to support the brand teams appropriately. Keytruda, G9 and Nexplanon have noted this and have shared their appreciations.
* Expand team based agile development (using Jira) for Mkt. Mix and IPF (new).
* Switched to Microsoft Teams for agile development as a team for Mkt. Mix and IPF.
* Pull-through on MAIO virtual BU team for CC/WH
* Have bi-weekly meetings and have been primarily focusing on cross learnings across different teams within MAIO. Benefits at this point include results sharing, data questions being answered and overall awareness of different MAIO team’s work.
* Externally Source Highly Skilled Quantitative Scientists to Expand Analytic Capacity-Datazymes, ZS
* Datazymes resources are more productive now and extensively supported Mkt. Mix processes, DET analysis and Grail-data development.
* We continue to work with ZS for Keytruda and new COVID related impact analysis projects.
* Continue the MAIO Analytics Internship Program (2 interns) to identify and evaluate early analytic talent.
  + Study Netflix approaches and implement relevant ones for NBE recommendations
  + <new>Michael Johnson – studied the deep learning convolutional NN and hybrid back propogation networks to mimic the NBE process for Januvia and Steglatro. The intern has created a strong R code base to continue the research. This is a complex project with highly challenging implementations and some clear learnings have come out of Michael’s work. Provides a future framework and code base to expand the studies.
  + Study PRCs through evaluation of predictive models (NN, Random Forest etc)
  + <new>Alex daSilva – another summer intern – has gone well beyond the objectives stated here and have studied interpretable ML as a means to obtain non-linear partial dependence plots that are equivalent of promotional response curves for various channels. Methods include, linear models, restricted and un-restricted GAMs, xgboost (traditional as well a monotonically increasing constrained ones). Alex has also created an automation tool in R for others in the team to explore their data. Interpretations were enhanced using Shapley regressions as a separate track of studies. Overall, this has been an extremely productive work and the outputs were way well beyond expectations.
* Provide department-wide R, Python & Best Practices training and project opportunities.
* A lot of cross-functional project opportunities being provided to all team members. Ex: Blythe assigned with Mkt Mix type analysis, Ambika & Arun with HCC analysis and client management in addition to Mkt Mix type analysis.

**COMPLIANCE Priorities:**

* Ensured all members of my organization carry a meaningful compliance priority, complete all required compliance training on time, and conduct themselves in a manner consistent with the letter and spirit of our policies
* Constructively engaged compliance and legal to gain input on business strategies, plans and initiatives.