BACKGROUND

Nowadays many mathematical models in various industries (life science, finance, R&D etc.) remain primarily Excel, Matlab, SAS or R based. Usage of these standalone programs provide a number of limitations primarily related to model usage by non experts (non modellers). On the other hand they have been designed to provide model development tools and technical capabilities to create a model. Recent market trends indicate that professionals in life sciences industry tend to transform and create interactive models (applets) because of their improved presentations qualities. This analysis presents users survey conducted by Digital Health Outcomes to understand various user perceptions about both standalone and web based model types.

OBJECTIVES

- Understand the key functional differences between conventional cost-effectiveness Excel and web based model types.
- Design a survey aiming to capture key functional and presentation criteria related to models lifecycle.
- Compare Excel models with HTML5/JavaScript models

METHOD

An online survey consisting of 18 users and 5 model model developers (n=23) was conducted. Profiles of surveyed people are presented at Figure 1 and Figure 3. Respondents were asked to rate key criteria of both Excel and web based model types on a scale from 0 to 10. As a benchmark for web models we have taken Javascript models developed by DHO.

Model types were compared with the following 13 criteria: model execution speed, size, general functionality support, accessibility, usability, model management and versioning, ease of backtracing, ease of model core modification, sharing, review process, usage analytics, integration with other content. No weighting to the scoring across criteria was applied. Survey 56%, 16%, 36% of respondents were geographically based in Europe, Latin America and Asia-Pacific region respectively.

RESULTS

Results of the survey indicate that web based models outperform standalone model types in 10 of the 13 criteria assessed. Model review process, ease of model core modification and execution speed was rated higher for conventional standalone Excel models. 80% of model owners and 78% of model users assigned higher overall score for web based models compared to Excel models (Figure 3).

Conclusions

Web based models offer advantages primarily related to model usage and lifecycle management. These models can be viewed on any hardware device or browser, thus overcoming the limitations of Excel models.

Excel engine, where all the math logic and dependencies are stored, is limited by hardware capabilities, while custom modeling development open the horizons of many different programming languages like Flash, JavaScript, HTML5, CSS, C++, Python etc. and their front end and back end potential.

The use of latest web technologies such as JavaScript, HTML5 and CSS improve user experience in model adoption and presentation to end audiences. Usage analytics, smart versioning, web sharing and automatic updates are the functional advantages that can not be achieved with conventional Excel models due to technical limitations.

Software applications tend to get more interconnected and complex. Standalone app are hard to “open into” a larger application. Therefore, applications need to be flexible as possible, in order to be combined with other apps with minimal technical intervention. Also, model flexibility then determines how easily it can be put into web environment in order to obtain useful services such as multimedia content, online databases, social media, location-based services, cloud computing and so on.

Usage analytics, improved usability, web sharing and automatic updates are the functional advantages that cannot be achieved with conventional Excel models due to technical limitations.

1. EXECUTION SPEED

Majority (77%) of users assessing calculations speed (1 model iteration) assigned higher overall score to Excel models. It is important to rate that model execution speed also depends on browser, computer power and even operating system.

2. MODEL SIZE

Model size appeared to be significantly smaller for web based JavaScript (JS) obtained models, Cells formatting, visual layers and text not used in calculation logic are not in JS models.

3. FUNCTIONS & FORMULAS SUPPORT

Since Excel was a primary source of model cores it scored better in terms of functions support. On the other hand available JavaScript statistical functions libraries and supper of other excel specific functions (OFFSET, PERROR, LOOKUP RANGE etc) is available for JavaScript web models.

4. ACCESSIBILITY

Web based models are much easier to access. Since the presentations layer is often programmed in HTML5 the model can be accessed from a browser of any device.

5. USABILITY

Interactive models are designed in such a way that even non technical people find them easy and engaging to use. Such design facilities are simply not available in older software, such as Excel. The use of interactive charts, sliders, radio buttons and other web elements improve models usability. Interactive modeling technologies allow to separate graphical representation components from its calculation core and logic. Thus, providing different users with different graphical interfaces tailored specifically to their needs, while model core remains the same.

6. MODEL LIFECYCLE MANAGEMENT

Almost every model takes changes throughout its lifecycle. Interactive web based model can be shared on web server and accessed by multiple users with different permissions. Therefore, any update or change to the model is distributed to all users immediately.

7. VERSIOMING

Cloud based infrastructure provide a better way of version. All model updates are instantly becoming available to all users when they open a new-model version. In case of Excel models a separate file has to be resent by email.

8. EASE OF LOCALISATION

Step-by-step model localisation wizard and availability of datasets of other users (from other countries, regions) are another features of interactive models that simplifies local adaptations.

9. MODEL CORE MODIFICATION

Original model environments provide a more comfortable means to model core modification. However automatic transformation of excel to JS facilitates the process of model core modification.

10. SHARING

Web models provide a much easier way of model sharing via a simple web link.

11. REVIEW PROCESS

Web platforms with specific user role allow to easily capture reviewer feedback, accept or reject comments and automatically adapt the model user interface accordingly.

12. USAGE ANALYTICS

Interactive modelling usually implies a two-way communication channel: the user can communicate the feedback and model owner can gather user's data. This approach enables model owners data and model owner can gather user’s data. This approach

13. INTEGRATION WITH OTHER CONTENT

Web models written in JavaScript can be easily integrated in any digital content via a specific API to model HTML5 models.

Figure 1. Distribution of respondents by role in the organisations

Figure 2. Distribution of respondents by type of organisation

INTERNATIONAL SOCIETY FOR PHARMAECOONOMICS AND OUTCOMES RESEARCH, NOVEMBER 2014, AMSTERDAM

MIGRATION OF HEALTH ECONOMICS MODELS TO WEB AND MOBILE ENVIRONMENTS.
WHY SHOULD MODELS GO WEB?

Topachovsky G., Volokoy A.
Digital Health Outcomes. digitalho.com