TECHNIQUES FOR FAVORABLE TECHNOLOGY ASSESSMENT AND SUCCESSFUL TECHNOLOGY INFUSION:

An ESIP Products & Services Testbed Project
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NH Project Background Info

- Research result of an ESIP Products & Services (P&S) Testbed, Fast Track Proposal
- P&S / ESIP Staff interest in developing criteria / questions for evaluators of AIST and other research projects
- Could be used to determine the overall "usefulness" of a research project / product / tool, but emphasis upon research project

Objectives

- Identify clear heuristics for evaluators to assess the overall usefulness of a research project
- Develop "rules of thumb" that can be applied by research project developers & evaluators
- Create or identify easy-to-use mechanism for evaluators to apply recommended rules of thumb

Method

- Review of literature on:
  - Usability of web site design
  - Technology "infusion" or "adoption potential"
- Identify use cases with *some* relevant tasks associated with evaluation of a research project
- Develop criteria for evaluating
- Create means of evaluating, scoring & commenting upon criteria
- Produce annotated bibliography from literature search

Definition – based on lit review

- "Usefulness" of a research web site
  - Assessing both the *utility* **of the web site, i.e., that it can** provide the functionality / features needed, and
  - **Assessing Its *usability***, i.e., having the features that are efficient, effective, engaging, error tolerant and easy to learn
  - ***Utility + Usability = Usefulness***

Approach

BASES:

Given: Technology Maturation Lifecycle expressed as (TRLs 1 – 9)

Process of Technology / Product Evaluation:

Understanding

Assessing

Packaging

Ranking Effectiveness (“Usefulness”) of Communication Vehicles by:

Learnability

Efficiency

Memorability

Errors

Satisfaction

from Different Points Of View:

Research Domain Expert (Use Case 1)

Workflow Domain Expert (Use Case 2)

Tool-builder (Use Case 3)

AIST Evaluator (Use Case 4)

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Effective Communication *key* to the overall Approach

Process of Evaluation

Ranking Effectiveness of Communication Vehicles

Potential for infusion from different points of view

1st -- Process of Technology / Product Evaluation

1. Understanding the technology / product

- Getting a reading on the baseline processes
- Figuring out the key characteristics, e.g., (from Comstock)
  - Performance
  - Schedule
  - Cost
  - Risk

Process of Technology / Product Evaluation

2. Assessing the technology / product

- How applicable to other systems?
- How would the key characteristics impact other systems & how?
- What improvements could be made in either the product or the processes?

Process of Technology / Product Evaluation

3. Packaging the technology / product

- How divisible / modular is the technology / product for purposes of transfer / re-use / infusion into other systems?
- If improvements are suggested, how feasibly could they be incorporated?

2nd -- Ranking Effectiveness ("Usefulness") of Communication Vehicles (CV) by:

- *Learnability*
- *Efficiency*
- *Memorability*
- *Errors*
- *Satisfaction*

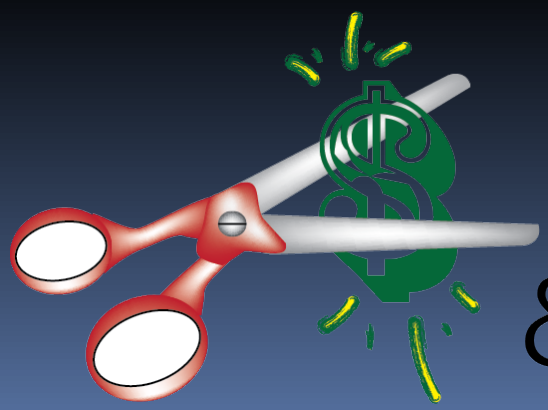
2nd -- Ranking Effectiveness ("Usefulness") of Communication Vehicles (CV) by:

- *Learnability*

- How easy is it for users to accomplish basic tasks the first time they encounter the CVs?

2nd -- Ranking Effectiveness ("Usefulness") of Communication Vehicles (CV) by:

- *Efficiency*
- Once users have learned the design, how quickly can they perform tasks?



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2nd -- Ranking Effectiveness ("Usability") of Communication Vehicles (CV) by:

- *Memorability*

- When users return to the design after a period of not using it, how easily can they reestablish proficiency?

2nd -- Ranking Effectiveness ("Usability") of Communication Vehicles (CV) by:

- *Errors*

- How many errors do users make, how severe are these errors, and how easily can users recover from the errors?

2nd -- Ranking Effectiveness ("Usability") of Communication Vehicles (CV) by:

- *Satisfaction*

- How pleasant is it to use the design?

3rd -- from Different Points Of View

- *Research Domain Expert* (Use Case 1)
- *Workflow Domain Expert* (Use Case 2)
- *Tool-builder* (Use Case 3)
- *AIST Evaluator* (Use Case 4)

from Different Points Of View

- *Research Domain Expert*
  - *(Use Case 1)*
  - *I am a domain expert in tropical cyclones and am looking for web-based tools or services to help my research group with certain types of analysis. I am interested in guidance on how to determine if a tool or service will be useful for addressing the research needs of my group.*

from Different Points Of View

- *Workflow Domain Expert*
  - *(Use Case 2)*
  - *I am a domain expert in tropical cyclones looking for web-based tools or services to help my research group perform certain types of analysis more efficiently and productively without requiring a lot of hands-on training or long ramp-up time.*

from Different Points Of View

- *Tool-builder*
  - *(Use Case 3)*
  - *I am a researcher building a tool to provide outcomes from model analyses for tropical cyclone research. I want this tool to be adopted by my research community. On what kinds of factors or points about my tool should I focus to help me meet that goal?*

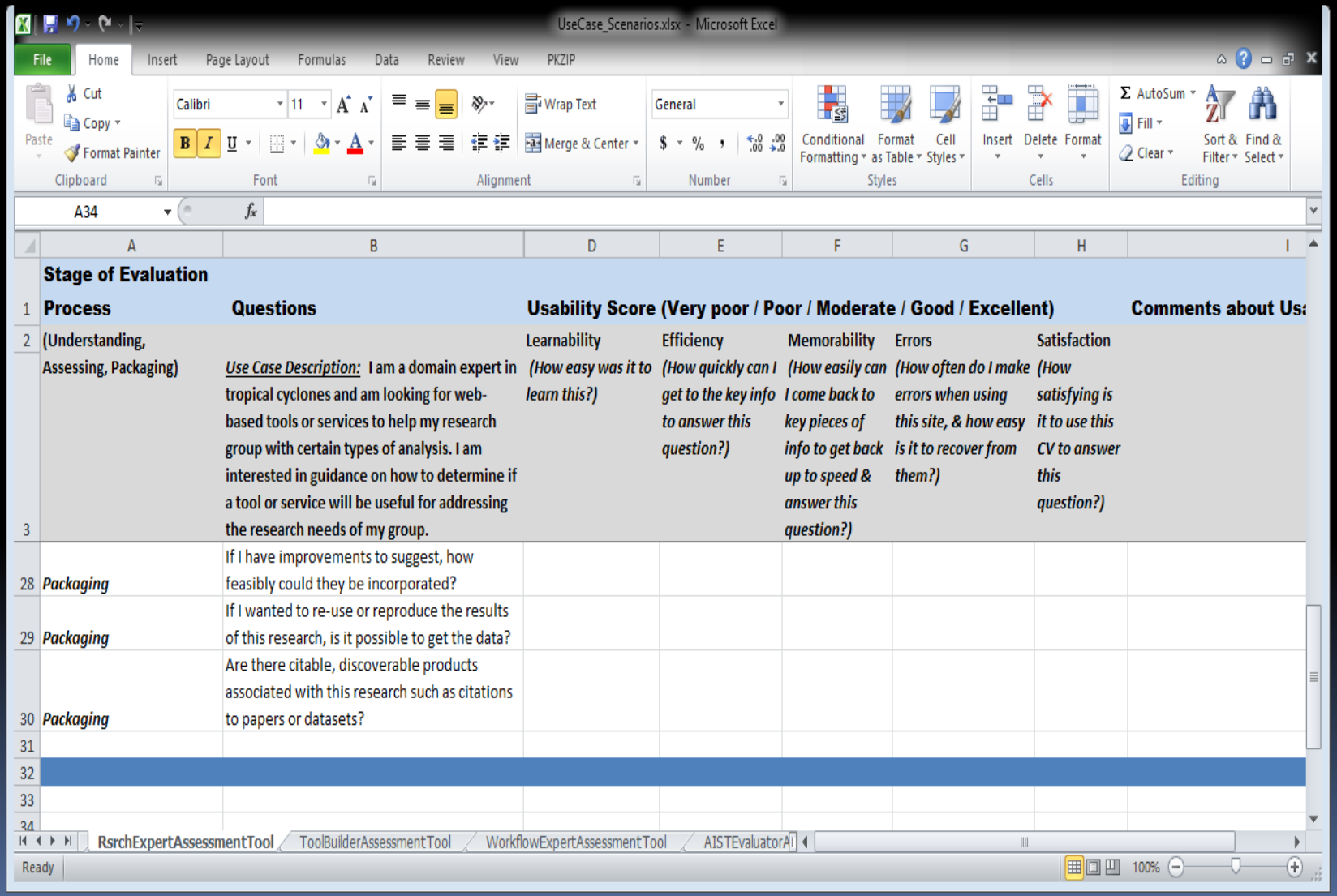
from Different Points Of View

- *AIST Evaluator*
  - *(Use Case 4)*
  - *As an evaluator, I am looking for ways to identify issues in the public web-based interfaces for a tool, service or research project to ascertain whether the stated goals have (or can't) be met. Likewise, I am interested in guidelines for identifying problems in an interface that might indicate issues with potential adoption.*

Evaluator Checklists

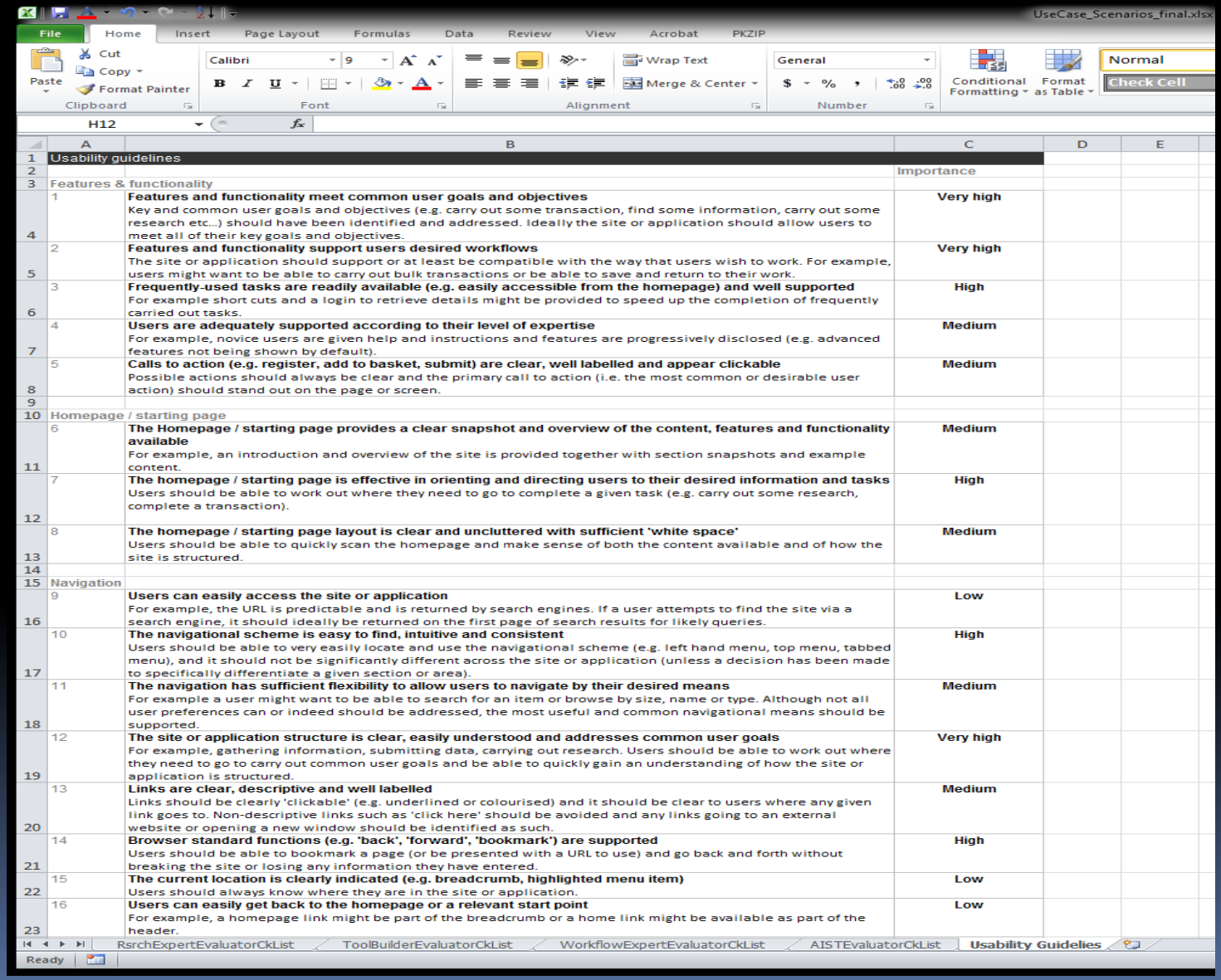
- It's a combination of TRL Evaluation & Communication Vehicle (CV) Assessment
  - Built for different evaluator perspectives
  - Similar questions, but could probably have different scores
  - Scoring is subjective (be definition), but not quantitative
  - Questions focused primarily upon communication vehicles used, e.g., project web sites, documentation, online help text, lists of references, etc.
  - Could be used at different points in the evaluation process, e.g., Understanding scores assigned early in the evaluation process

Research Domain Expert Tool



	A	B	D	E	F	G	H	I
1	**Stage of Evaluation Process**	**Questions**	**Usability Score (Very poor / Poor / Moderate / Good / Excellent)**					**Comments about Usa**
2	(Understanding, Assessing, Packaging)	***Use Case Description:*** I am a domain expert in tropical cyclones and am looking for web-based tools or services to help my research group with certain types of analysis. I am interested in guidance on how to determine if a tool or service will be useful for addressing the research needs of my group.	Learnability *(How easy was it to learn this?)*	Efficiency *(How quickly can I get to the key info to answer this question?)*	Memorability *(How easily can I come back to key pieces of info to get back up to speed & answer this question?)*	Errors *(How often do I make errors when using this site, & how easy is it to recover from them?)*	Satisfaction *(How satisfying is it to use this CV to answer this question?)*	
28	***Packaging***	If I have improvements to suggest, how feasibly could they be incorporated?						
29	***Packaging***	If I wanted to re-use or reproduce the results of this research, is it possible to get the data?						
30	***Packaging***	Are there citable, discoverable products associated with this research such as citations to papers or datasets?						
31								
32								
33								
34								

Usability Guidelines



UseCase_Scenarios_final.xlsx

File | Home | Insert | Page Layout | Formulas | Data | Review | View | Acrobat | PKZIP

Cut | Copy | Format Painter | Paste | Clipboard | Calibri | 9 | Font | Wrap Text | Merge & Center | Alignment | General | Number | Conditional Formatting | Format as Table | Normal | Check Cell

H12

	A	B	C	D	E
1	Usability guidelines				
2			Importance		
3	Features & functionality				
4	1	**Features and functionality meet common user goals and objectives** Key and common user goals and objectives (e.g. carry out some transaction, find some information, carry out some research etc...) should have been identified and addressed. Ideally the site or application should allow users to meet all of their key goals and objectives.	**Very high**		
5	2	**Features and functionality support users desired workflows** The site or application should support or at least be compatible with the way that users wish to work. For example, users might want to be able to carry out bulk transactions or be able to save and return to their work.	**Very high**		
6	3	**Frequently-used tasks are readily available (e.g. easily accessible from the homepage) and well supported** For example short cuts and a login to retrieve details might be provided to speed up the completion of frequently carried out tasks.	**High**		
7	4	**Users are adequately supported according to their level of expertise** For example, novice users are given help and instructions and features are progressively disclosed (e.g. advanced features not being shown by default).	**Medium**		
8	5	**Calls to action (e.g. register, add to basket, submit) are clear, well labelled and appear clickable** Possible actions should always be clear and the primary call to action (i.e. the most common or desirable user action) should stand out on the page or screen.	**Medium**		
9					
10	Homepage / starting page				
11	6	**The Homepage / starting page provides a clear snapshot and overview of the content, features and functionality available** For example, an introduction and overview of the site is provided together with section snapshots and example content.	**Medium**		
12	7	**The homepage / starting page is effective in orienting and directing users to their desired information and tasks** Users should be able to work out where they need to go to complete a given task (e.g. carry out some research, complete a transaction).	**High**		
13	8	**The homepage / starting page layout is clear and uncluttered with sufficient 'white space'** Users should be able to quickly scan the homepage and make sense of both the content available and of how the site is structured.	**Medium**		
14					
15	Navigation				
16	9	**Users can easily access the site or application** For example, the URL is predictable and is returned by search engines. If a user attempts to find the site via a search engine, it should ideally be returned on the first page of search results for likely queries.	**Low**		
17	10	**The navigational scheme is easy to find, intuitive and consistent** Users should be able to very easily locate and use the navigational scheme (e.g. left hand menu, top menu, tabbed menu), and it should not be significantly different across the site or application (unless a decision has been made to specifically differentiate a given section or area).	**High**		
18	11	**The navigation has sufficient flexibility to allow users to navigate by their desired means** For example a user might want to be able to search for an item or browse by size, name or type. Although not all user preferences can or indeed should be addressed, the most useful and common navigational means should be supported.	**Medium**		
19	12	**The site or application structure is clear, easily understood and addresses common user goals** For example, gathering information, submitting data, carrying out research. Users should be able to work out where they need to go to carry out common user goals and be able to quickly gain an understanding of how the site or application is structured.	**Very high**		
20	13	**Links are clear, descriptive and well labelled** Links should be clearly 'clickable' (e.g. underlined or colourised) and it should be clear to users where any given link goes to. Non-descriptive links such as 'click here' should be avoided and any links going to an external website or opening a new window should be identified as such.	**Medium**		
21	14	**Browser standard functions (e.g. 'back', 'forward', 'bookmark') are supported** Users should be able to bookmark a page (or be presented with a URL to use) and go back and forth without breaking the site or losing any information they have entered.	**High**		
22	15	**The current location is clearly indicated (e.g. breadcrumb, highlighted menu item)** Users should always know where they are in the site or application.	**Low**		
23	16	**Users can easily get back to the homepage or a relevant start point** For example, a homepage link might be part of the breadcrumb or a home link might be available as part of the header.	**Low**		

RsrchExpertEvaluatorCkList | ToolBuilderEvaluatorCkList | WorkflowExpertEvaluatorCkList | AISTEvaluatorCkList | Usability Guidelies

Ready

Recommendations / Next Steps

- Add to questions for 3 use cases besides the research domain expert
- Add different "persona" approach to augment and clarify the Use Cases
- Test in a couple of venues with web sites relating to each of the use cases, i.e., a research project, a tool site, a project describing a workflow (hard to find?), an AIST technology project, e.g., – e.g., with Stace Beaulieu, from BCO-DMO, and/or Natalie Meyers from the Open Science Framework on research project web sites. Test for feedback upon, for example:
  - The "Usefulness" approach – melding of the two areas of research
  - The viability of the questions from each use case / persona POV
  - The utility of the rating mechanism (i.e., as subjective, but non-quantitative)
- Iterate the questions on the Checklists based on the testing
- Re-draft the guidelines based on the testing using a specific research web site as an example
- Perhaps write a paper for publication after testing in conjunction with the AIST assessment if these heuristics prove useful to those efforts

Thoughts?
Comments?

Notes

- Tropical Cyclone - NASA https://www.nasa.gov/mission_pages/hurricanes/main/index.html