The Application Usability Level framework

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Connections

Traversing the Valley of Death: How best to find research ready for operations and operational needs where research can help.

Barrier for effective applied space weather: (from the research side)

1) Finding and knowing best how to communicate with end users
2) Knowing what research will produce useful tools to aid decision making processes.
3) Knowing the requirements and needs of the user community
4) Advertising how our research could be useful

A New Framework for Tracking Progress

The AUL Framework

As space physics becomes both more inter – multi- and trans - disciplinary and more intertwined with commercial and government operations, there is a need for a framework to easily identify what projects can be used for specific applications and how close each project is to routine autonomous or on-demand implementation and operation. We have developed the Application Usability Level (AUL) framework and encourage publication of instrument-like papers for delivering and publicizing AULs to help the community quantify the progress of successful applications, metrics, and validation efforts.

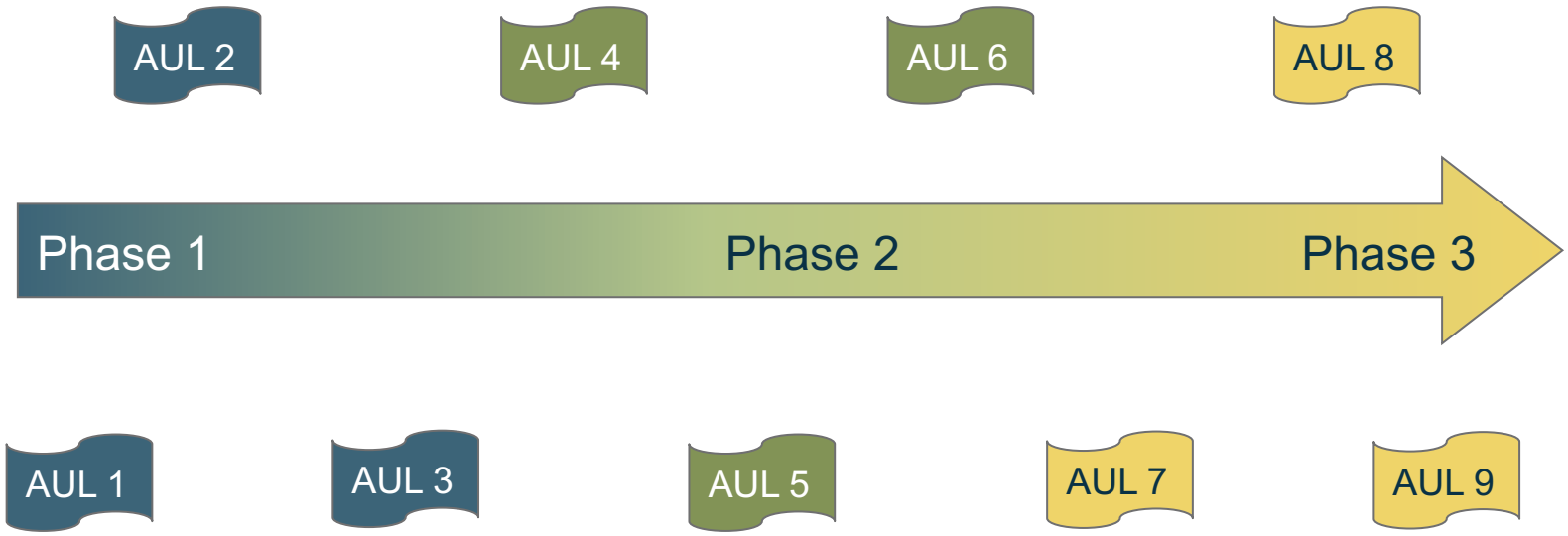
Connections

Application Usability Levels

Proposed tracking method

AUL: Application Usability Level

An effective framework to aid in communication, track progress of a project towards completion, and advertise user needs and research capabilities.



AULs

Application Usability Levels

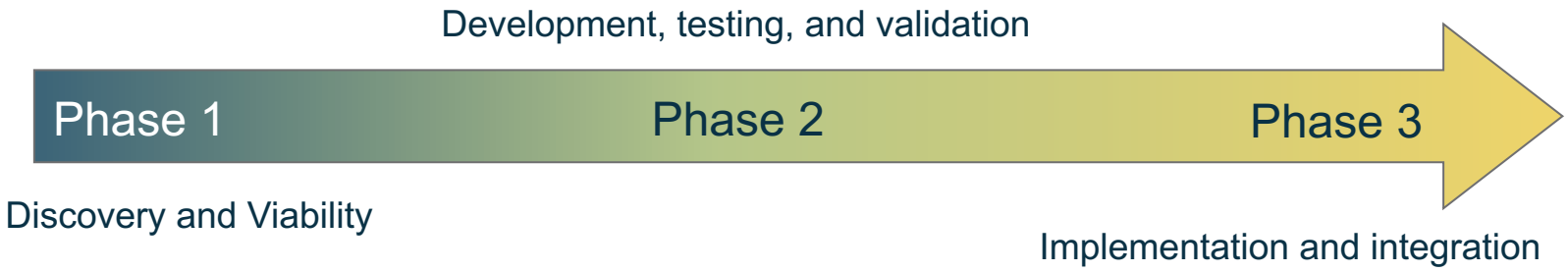
Proposed tracking method

Phases:

Phase 1: Discovery and Viability

Phase 2: Development, Testing, and Validation

Phase 3: Implementation and integration into operational status.

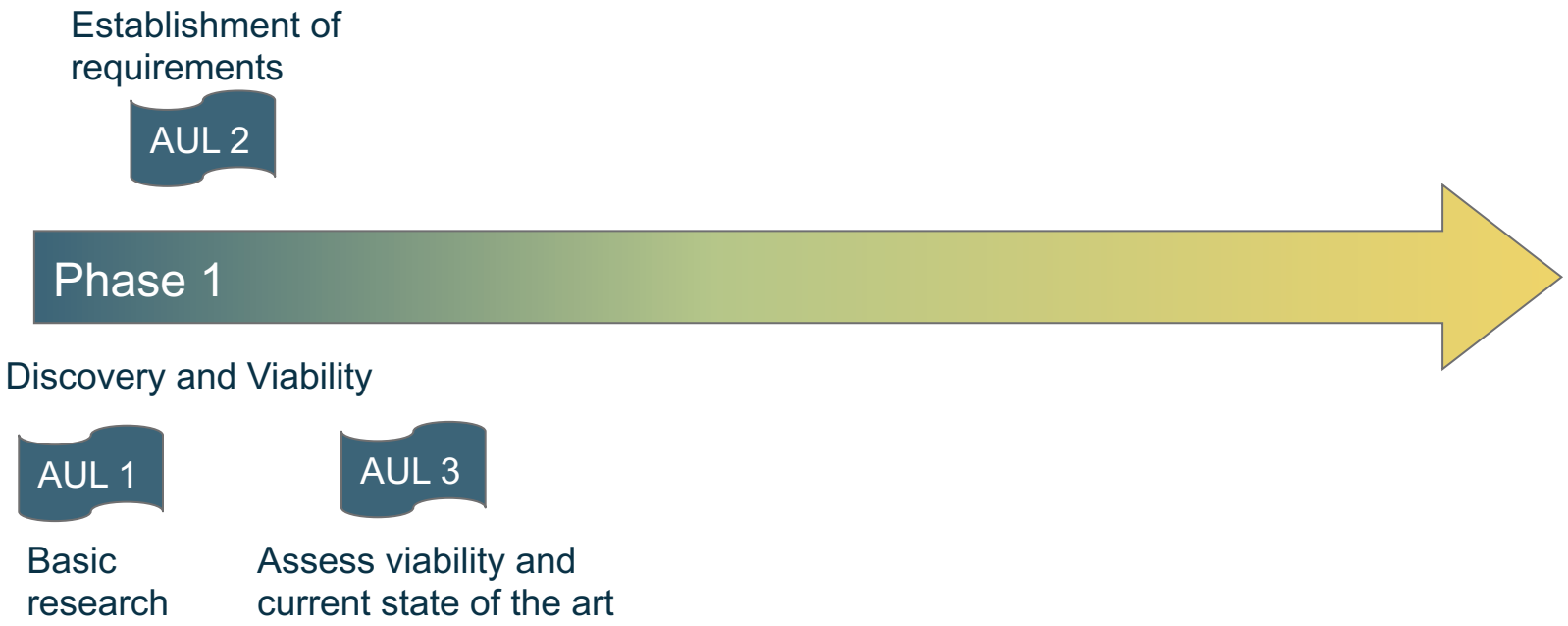


Application Usability Levels

Proposed tracking method

Phase 1: Discovery and Viability

In phase I fundamental research becomes applied. Not all research may or should progress beyond the very first AUL. However, if there is a potential user identified, whether they are a fellow researcher or an industry partner, then this phase will determine whether the project should progress to phase II.



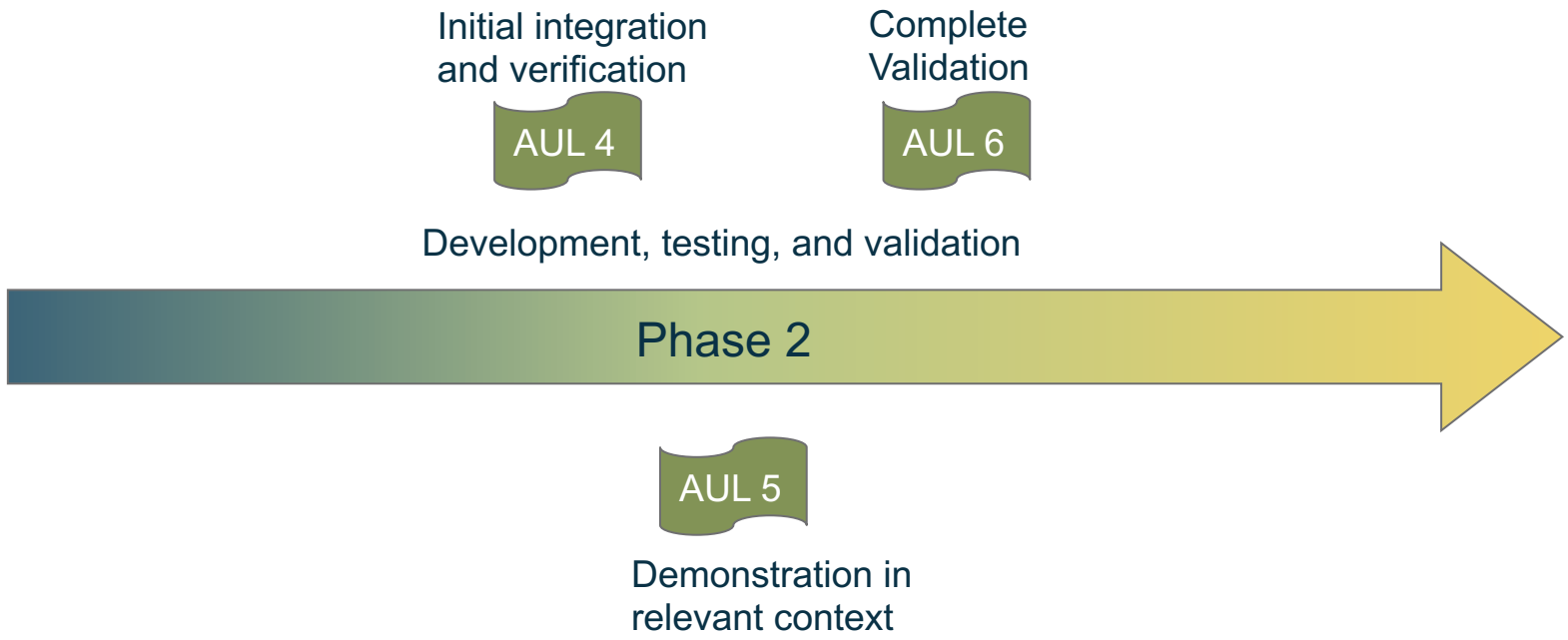
AULs

Application Usability Levels

Proposed tracking method

Phase 2: Development, Testing, and Validation

In phase II there is a focus on finalizing development of the new state-of-the-art project integrating the resulting tools into the identified applications, demonstrating the feasibility of the new product and validating the new system.



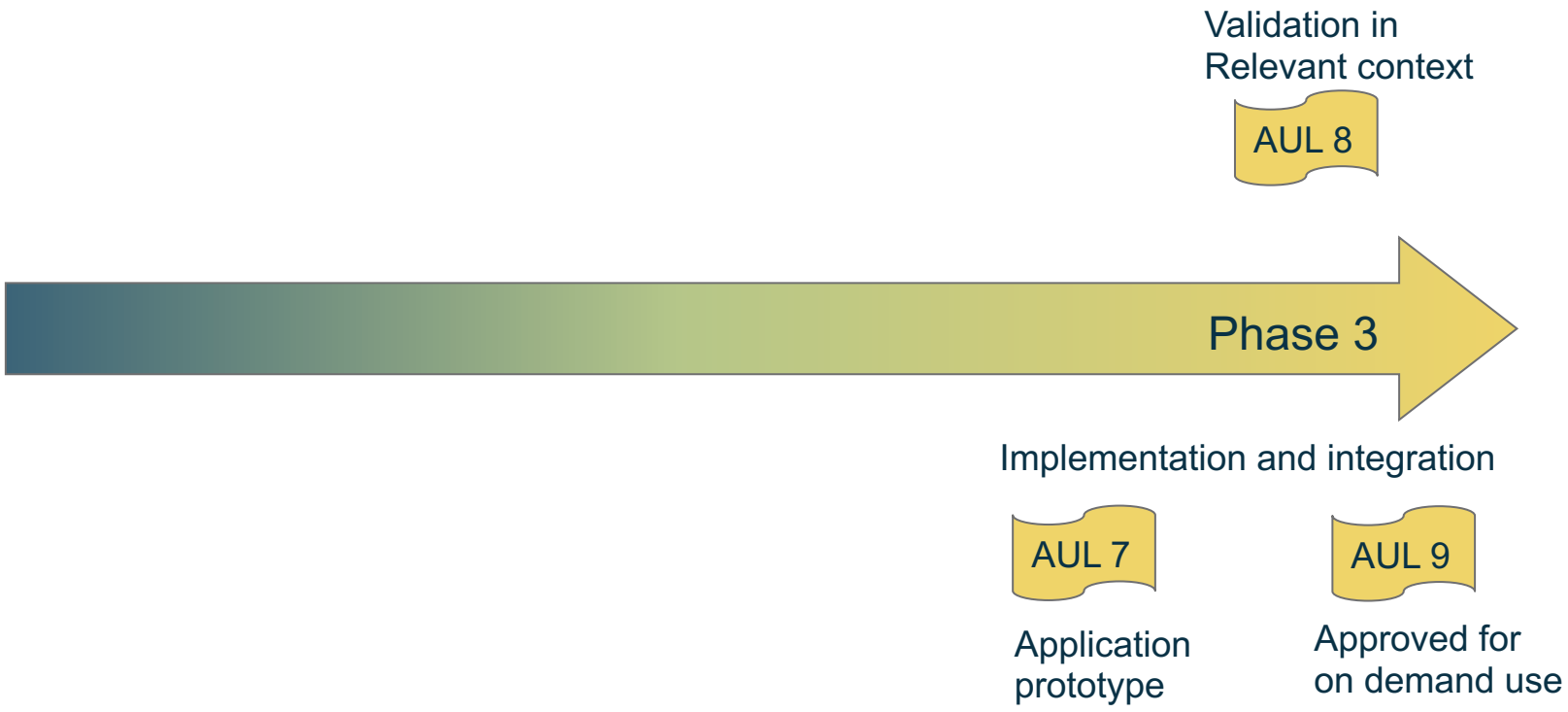
AULs

Application Usability Levels

Proposed tracking method

Phase 3: Implementation and Integration

The project is handed off and fully integrated into the end user's application in phase III. This also includes new validation efforts to determine how well the new application performs in a “real world” setting. Validation and continued use in an operational environment drives discovery of new science questions, problems, and of course new applications.



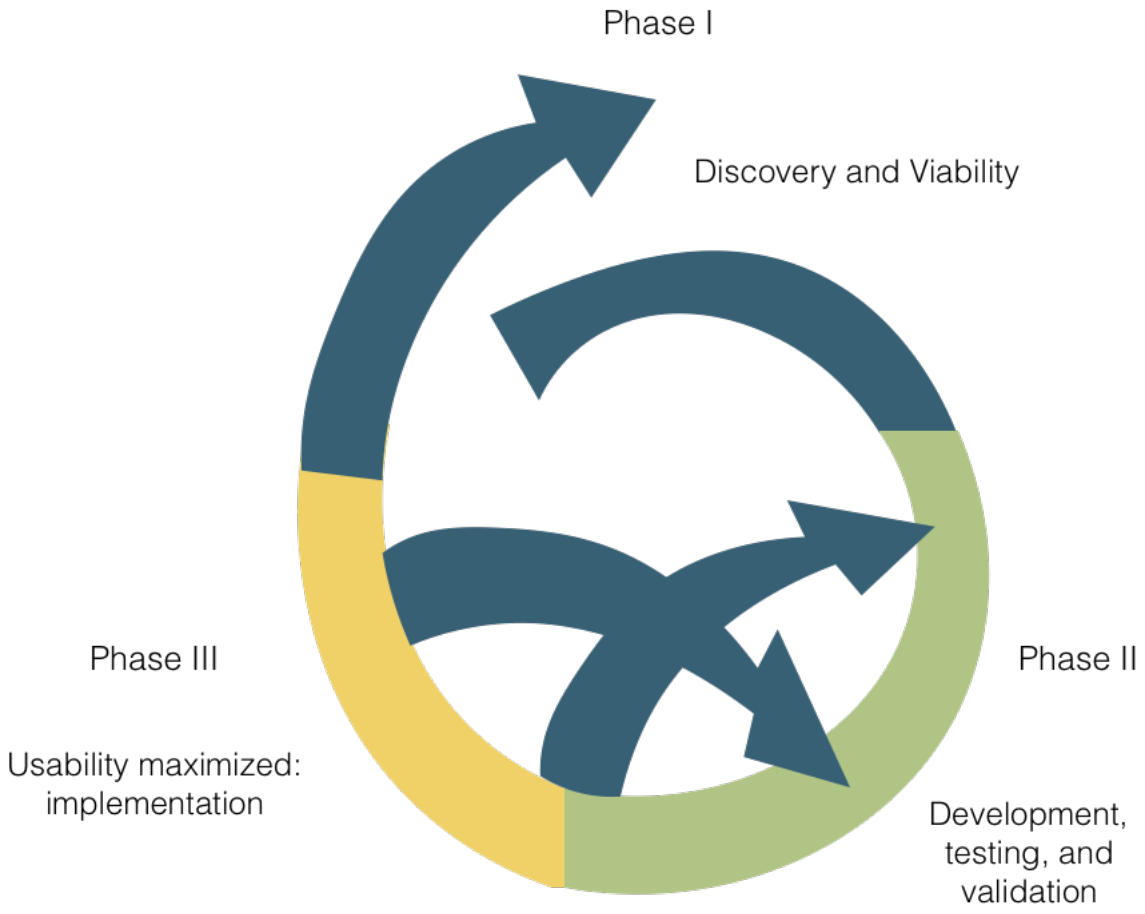
AULs

Application Usability Levels

Beyond Phase 3

A spiral process:

As a project progresses, roadblocks, new understandings, changes to requirements may all pop up. This may mean that the project circles back to lower AUL levels for a moment until they are addressed. This is perfectly normal.



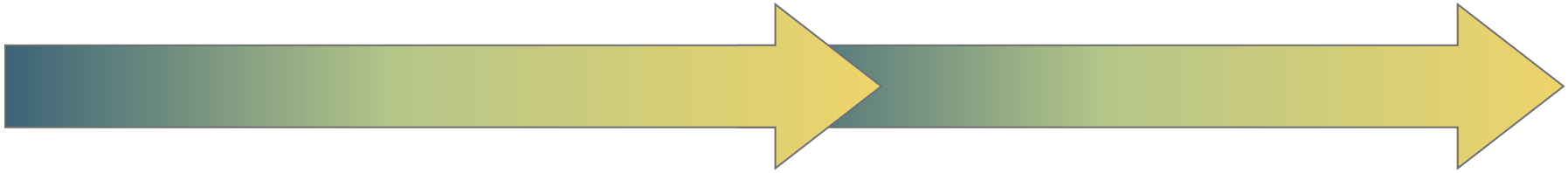
AULs

Application Usability Levels

Beyond Phase 3

Beyond Phase 3: The next Application

During Validation in level 9 new requirements to improve the application may be identified. With the new requirements, a new application is defined and the process starts again.



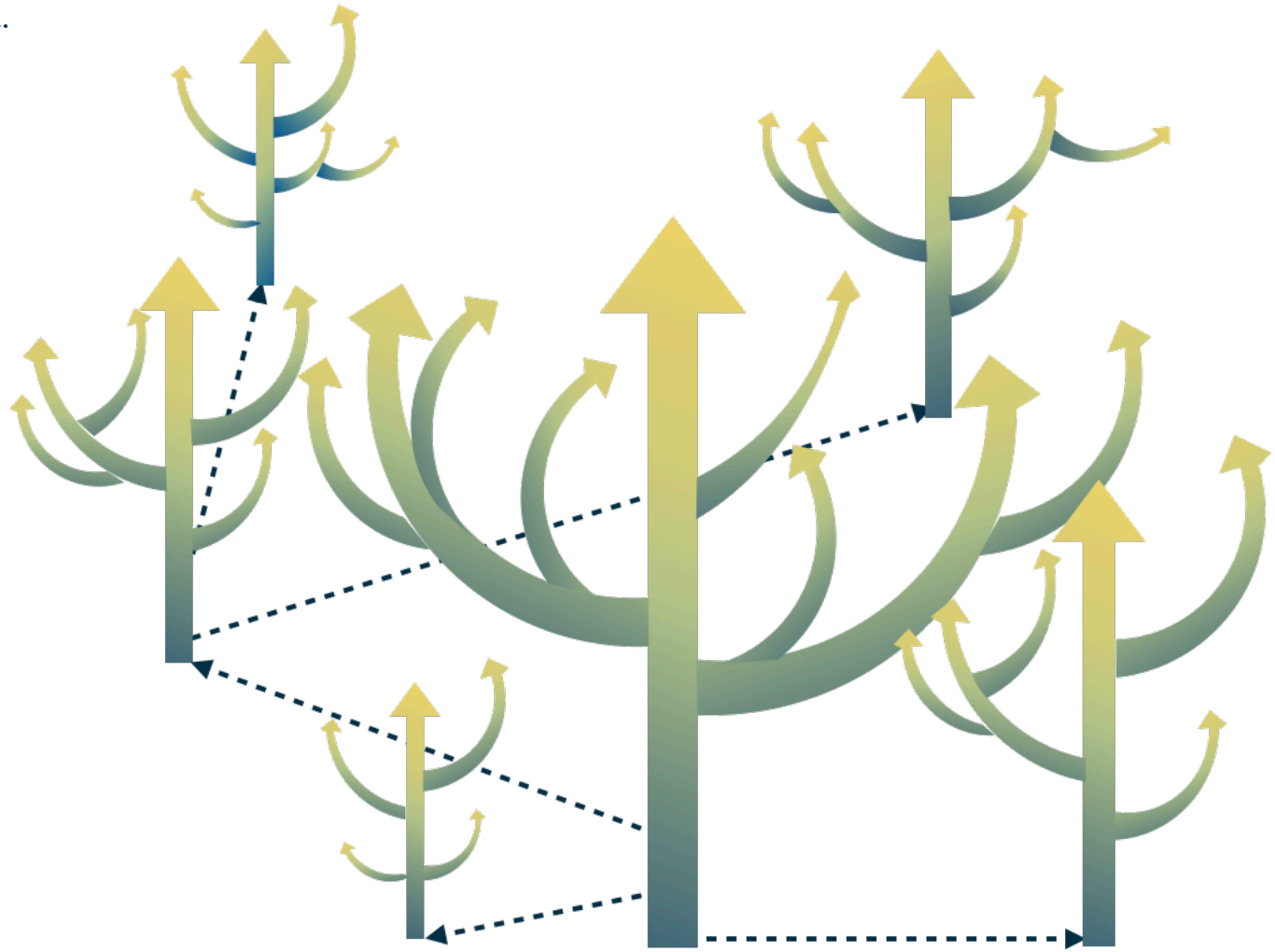
AULs

Application Usability Levels

Beyond Phase 3

A forest of AULs: New Users and New Areas to move into

AULs are much like an Aspen grove. The basic research foundation can give rise to many applications as one moves through the framework. It's also true that as one works on a project with a user, new applications can be discovered and pursued.



AULs

Application Usability Levels

Examples:

An AUL 1 project

Jeff has a new CubeSat mission and believes that their data will be useful to modelers. They have just written their instrument paper and have started considering the temporal and types of data products which will be useful as an input for modelers.

Phase 1 Milestones:

- ✓ AUL1 - Ideas for how project output may enhance decision making or be applied to an end user application.
- ✓ AUL1 - Research is documented and disseminated for the project, so that the usability may be assessed by way of the AUL method.
- ✓ AUL1 - Potential interested end users are identified, but not necessarily contacted.

Discovery and Viability

AULs

AUL 1

Basic research

Application Usability Levels

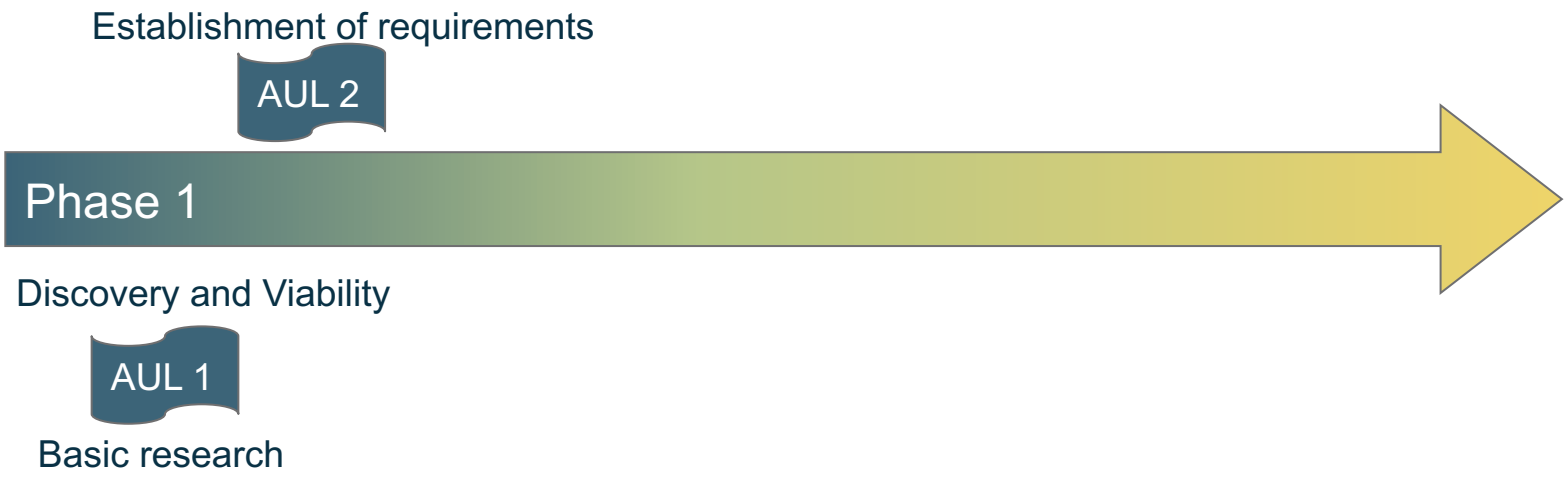
Examples:

An AUL 1 project

Jeff has a new CubeSat mission and believes that their data will be useful to modelers. They have just written their instrument paper and have started considering the temporal and types of data products which will be useful as an input for modelers.

Phase 2 Milestones:

- ✓ AUL2 - Formalization of the application.
- ✓ AUL2 - An end user is contacted and avenues of communication are established.
- ❑ AUL2 - Identification and formalization of the requirements and metrics necessary for successful application of the project for the end user's needs.



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AULs

Application Usability Levels

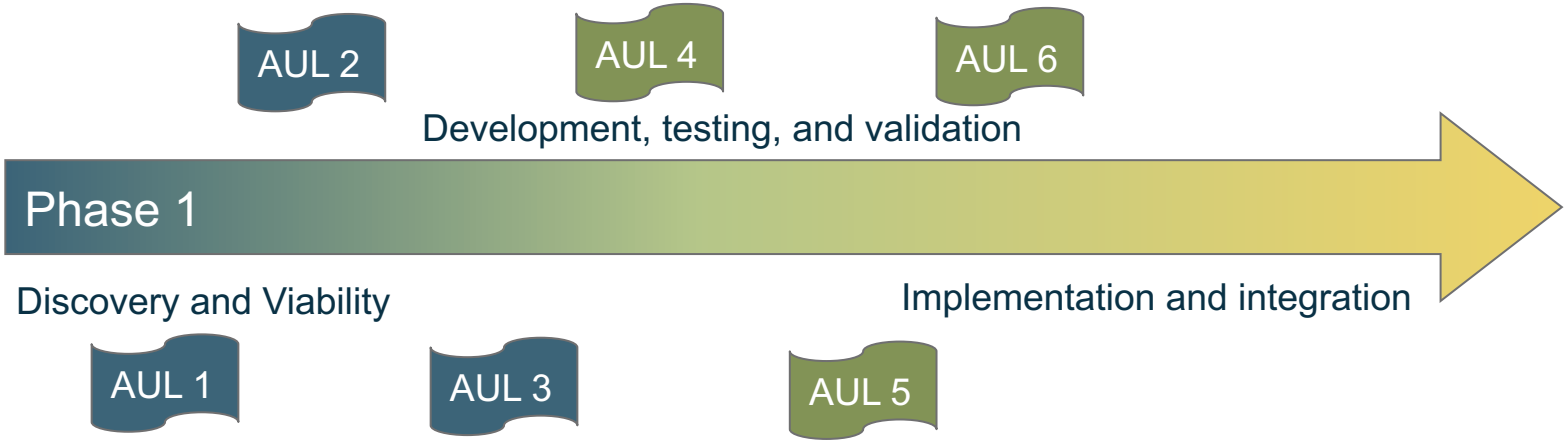
Examples:

An AUL 6 project

Brett has a new real-time forecasting model of plasma bubbles for the Australian Bureau of Meteorology. Together they have determined specific metrics and requirements. The new model has been validated and working for the relevant environments in a simulated operational environment at RMIT and shown to be better than the current state of the art. The results were just published in Space Weather.

Milestones:

- ✓ AUL6 - Prototype application system beta-tested in a simulated operational environment.
- ✓ AUL6 - Projected improvements in performance of the state-of-the-art and/or decision making activity demonstrated in simulated operational environment.
- ✓ AUL6 - Publication of the specific application and associated metrics and the projects progress towards this application.



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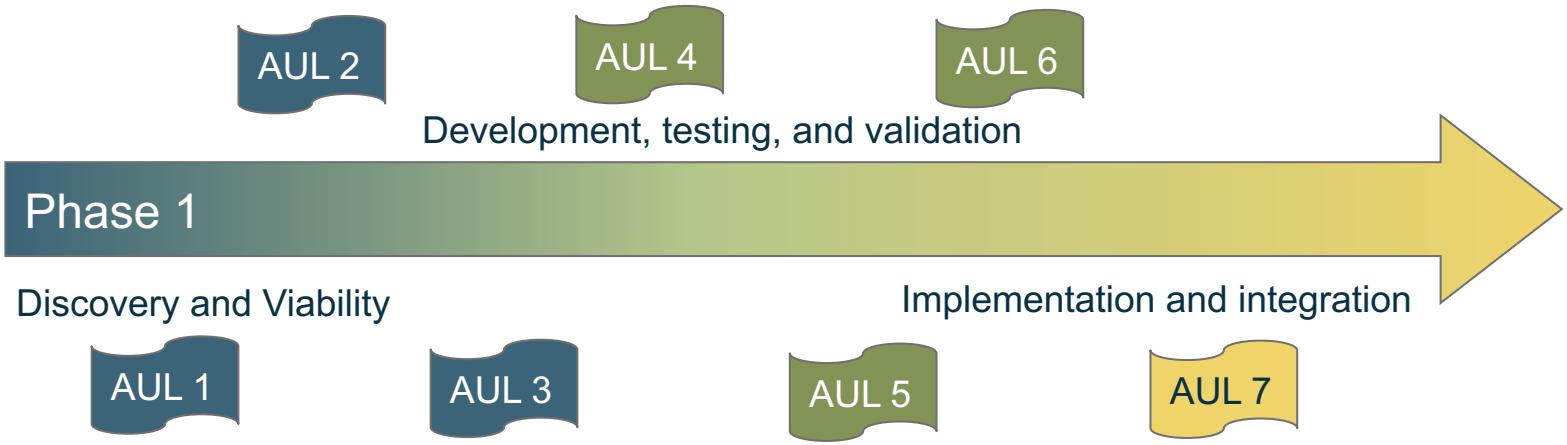
- ❑ AUL7 - The system must be fully integrated into the operational environment specified by the end user.
- ❑ AUL7 - The system's functionality is tested and demonstrated in the end user's specified relevant environment.
- ✓ AUL7 - Project team must demonstrate the functionality of the new system for the end user's application and disseminate the results.



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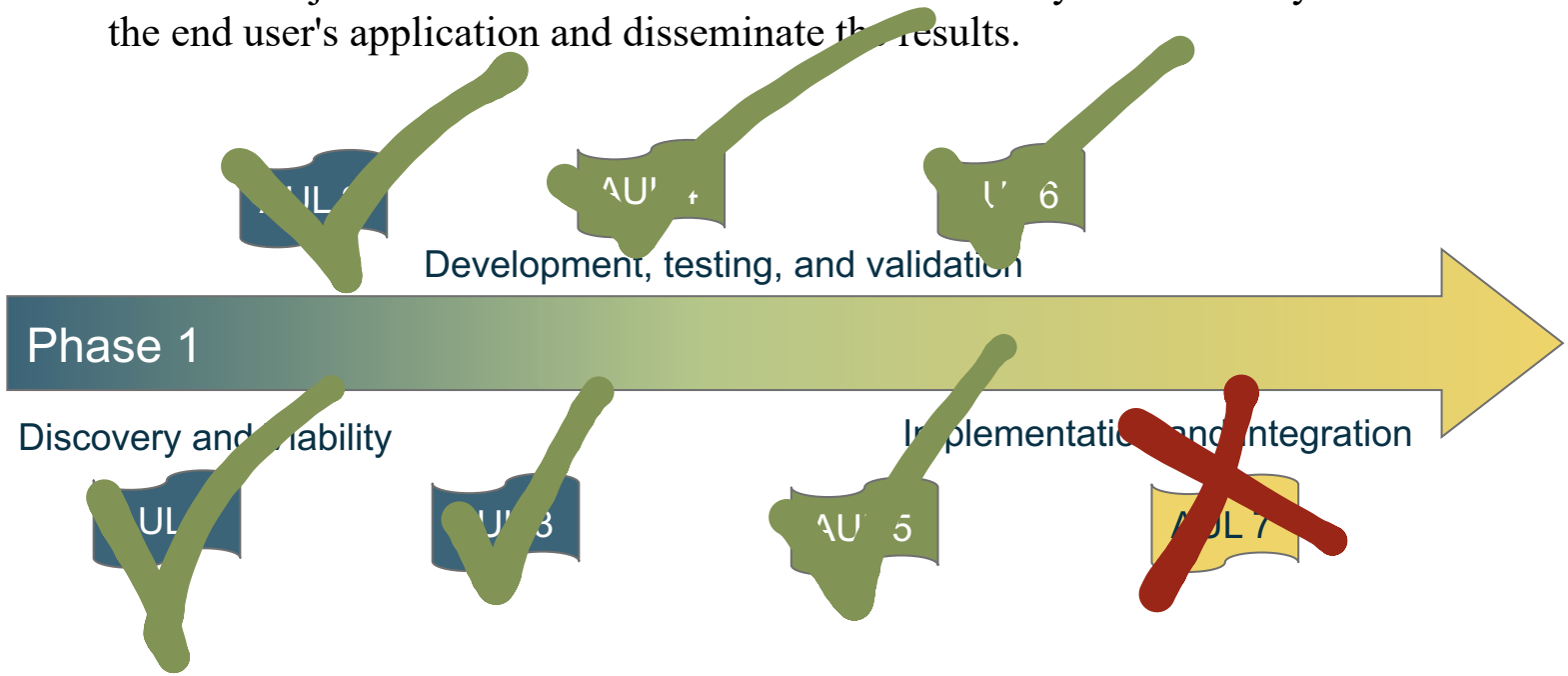


AULs

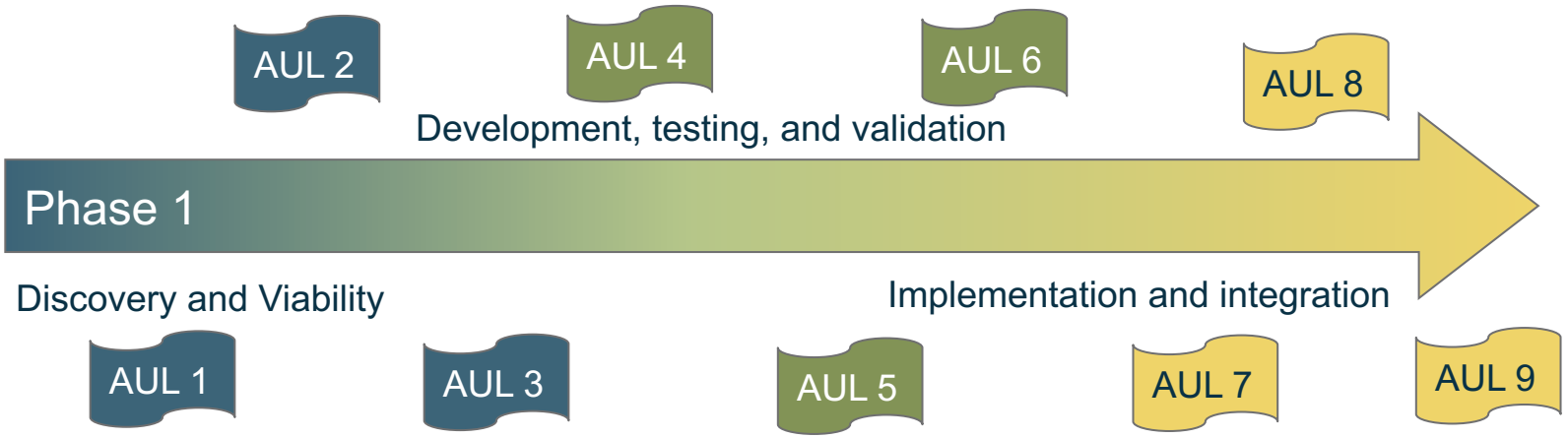
Application Usability Levels

Examples:

An AUL 9 project

Alexa is looking to design a mission and needs to understand how many satellites and in which orbits will optimize the data collected to answer the science questions. Aerospace has a tool that Stephanie works with to optimize orbits to specified ground constraints called GRIPS. This new version of GRIPS will optimize for constraints in space and provided science objectives. https://tinyurl.com/GRIPS4Science

- ✓ AUL8 – The user must approve the addition of the new project to their operational application system.
- ✓ AUL8 – Finalized application system tested, proven operational, and shown to operate within the specified requirements and metrics.
- ✓ AUL8 – Applications qualified and approved by the user.
- ✓ AUL8 – User documentation and training completed



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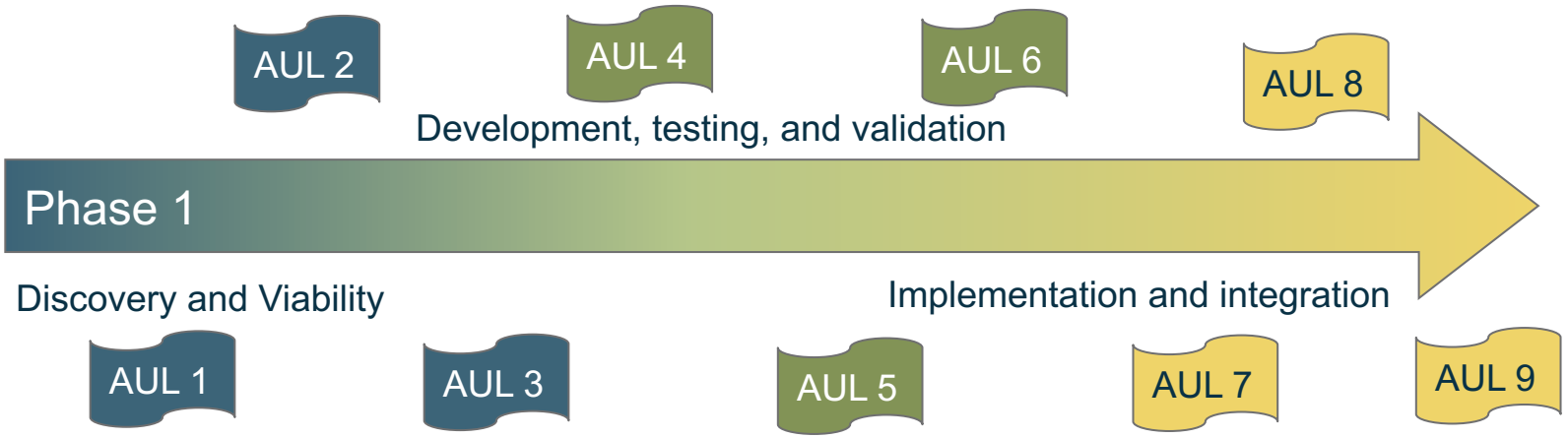
- ✓ AUL9 – Sustained and repeated use of the application by the specified users.
- ✓ AUL9 – The continued validation of the project in the operational environment.
- ✓ AUL9 – Dissemination of the validation efforts, metrics and new state of the art project to the relevant community for the specific application.



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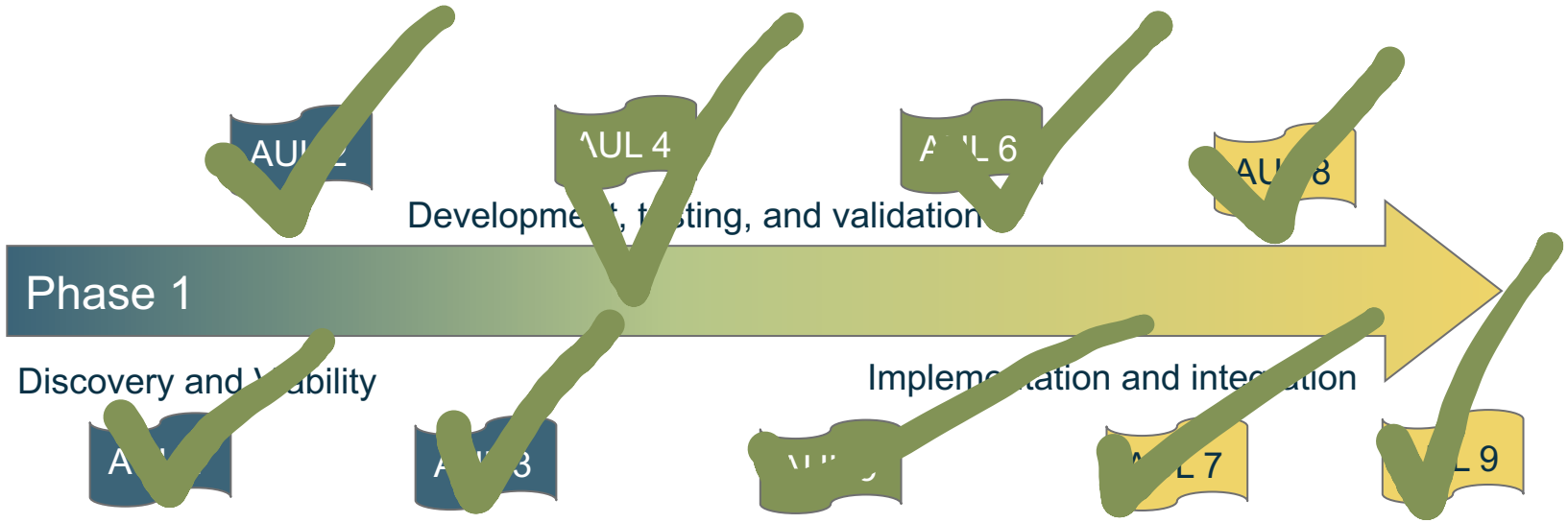


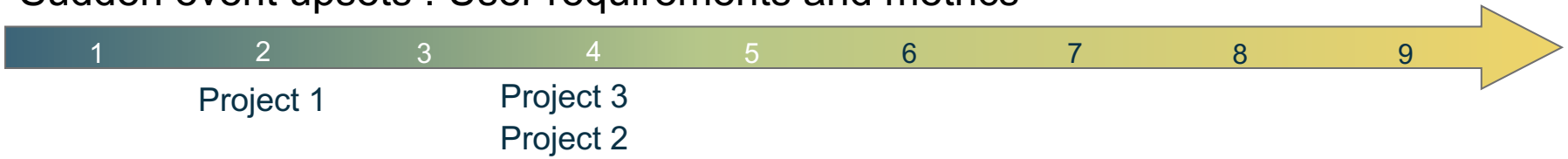
Connections

What research tools will produce useful tools to aid decision making processes?

Applications:

GIC impacts: User requirements and metrics

Sudden event upsets : User requirements and metrics



CME Arrival: User requirements and metrics

Application Usability Levels

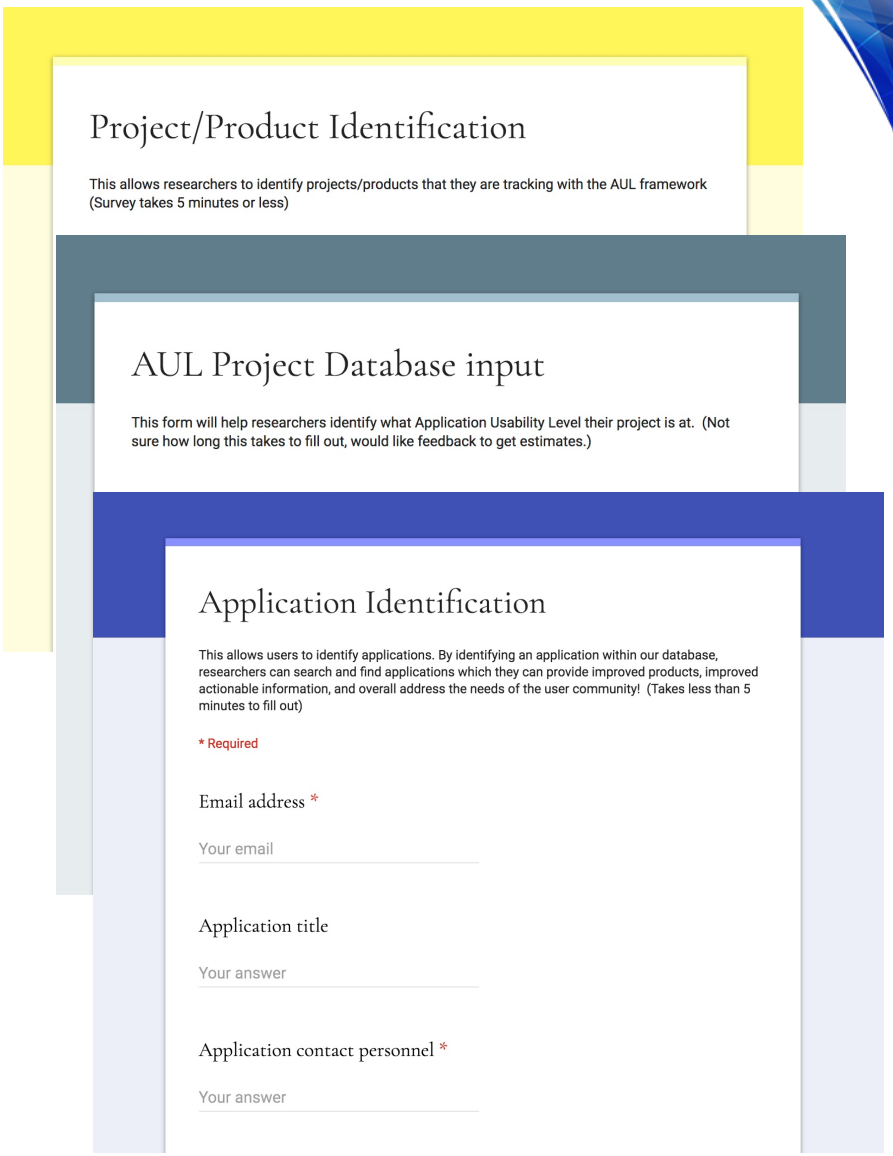
Coming next:

An AUL Database:

Add your project to the database
https://tinyurl.com/AUL-Project-ID

Add your project's progress to the database
https://tinyurl.com/AUL-Milestones

Add your application to the database
https://tinyurl.com/AUL-App-ID



Get involved

Assessment of Understanding and Quantifying Progress

This work has been completed as part of the activities of the Assessment of Understanding and Quantifying Progress working group which is part of the International Forum for Space Weather Capabilities Assessment. More information can be found at

International Forum for Space Weather Capabilities Assessment:

https://ccmc.gsfc.nasa.gov/assessment/forum-topics.php

Assessment of Understanding and Quantifying Progress:

https://ccmc.gsfc.nasa.gov/assessment/topics/trackprogress.php

http://spacewx.weebly.com/tracking-progress.html

The AUL White Paper from Aerospace:

https://tinyurl.com/AppUseFrame

AUQP

MSFC/NASA

A new Space-Weather Center CASII

Center for Assessing Space-Weather Impacts and Innovation

Coming this Summer/Fall: Space-Weather Seminar series.

Looking for people to give Research to Operations and Operations to Research talks –~15 minutes with 45 minutes for discussions.

Who should come? Those interested in space-weather, those who are affected by space-weather and those who do space-weather research.

Find out more about CASII: https://tinyurl.com/CASII-Concept

CASII: Get involved

Center for Assessing Space-Weather Impacts and Innovation

Join our mailing list at
https://tinyurl.com/CASIIpost

Find out more about Space-Weather at Aerospace
https://aerospace.org/spacewx

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