

**Establish a Center for the Advanced Study of Adaptation (CASA) at ESF**

*Core group:* Scott Turner (EFB); Margaret Bryant (Landscape Architecture);  
Rafaaf Hussein (PBE); Don Carr: School of Design (SU)

***The discovery opportunity:*** We propose to establish at ESF a world-class Institute for Advanced Study (IAS), concerned broadly with the phenomenon of adaptation.

Adaptation is a fundamental attribute of life, and the phenomenon of adaptation animates any discipline of study that is concerned with life, however tangentially. This includes the life sciences themselves (ranging from physiology and medicine to ecology and evolution), and beyond, including: the physical sciences and engineering disciplines that draw inspiration from life (biomimetics); design and architecture; the study of human, animal and microbial societies; philosophy of cognition and mind. We by no means have exhausted the list of disciplines that have adaptation as a central, albeit sometimes unspoken, premise.

Adaptation ([literally](#), tendency to aptitude) is concerned with the relationship between living nature, however it is organized (e.g. cell, organism, or society) and the environment. This relationship exists in physical, material, social and cognitive dimensions, and it exists at scales from the cellular to the planetary. It is universal.

Despite its importance, adaptation remains a poorly understood concept, riddled with incoherencies, even within disciplines like evolutionary biology and ecology where one would expect it to be best understood (1-3). The incoherency extends beyond biology. Biomimicry, for example, cannot articulate a convincing rationale for what, exactly, it is about life that should be mimicked (4). Recent controversies in evolutionary thought underscore the uncertainty over the drivers of evolution, including the crucial question of what adapts to what? (5, 6) There remains no common language of design that could unify the biological disciplines with engineering, design, art, and philosophy (7). Despite more than a century of dazzling scientific success, there still is no good answer to the perennial question: what is life? (1, 8-10)

We assert that understanding adaptation stands out as *the* core discovery challenge for a college, like ESF, whose [mission](#) is dedicated to the living and physical environment

Rising to that challenge will not be through a conventional research program. The question of adaptation engages the gamut of inquiry from the scientific to the philosophical to the artistic. Therefore, we seek to establish at ESF an intellectual environment that brings together a wide range of thinkers from all disciplines, both from the academy, and from vernacular thinkers from outside the academy. In short, we seek to establish a center where it is possible to do an intellectual deep dive into what will be unpredictable, unfamiliar, and surprising waters.

Our specific goal is to establish at ESF a Center for the Advanced Study of Adaptation (CASA). This is a high-risk, high payoff venture, modeled after the various Institutes for Advanced Study (IAS) that are located around North America, Europe, Israel and Africa. These institutes fall under an informal consortium (the SIAS Consortium) organized around a common model. The IAS model supports extended residencies of thinkers (Fellows) in an environment that promotes free-wheeling, open-ended and broad interactions, both among the Fellows themselves, and with the academic community in which the IAS is embedded.

**Action plan:** The seed grant would support the considerable logistical and reputation-building effort involved in building CASA to sustainable operation within three years. We recognize this as a very ambitious (audacious) goal. We plan to proceed roughly as follows:

**Year 1: Consultancy.** The first year will be devoted to building the framework of CASA. The Core Group (Turner, Bryant, Hussein and Carr) will invite up to eight individuals from ESF and SU to form a Working Group, which will serve as an informal advisory board. Through the year, we will invite 6-10 eminent individuals for 1-2 week residencies as **CASA Advisors (CAs)**.<sup>i</sup> CAs will include eminent scholars, former directors of other IASs, as well as individuals who can advise on building sustainability. While in residence, CAs will be asked to conduct short intensive workshops / seminars for faculty and students, exploring the broad issue of adaptation. CAs will also be expected to consult with the Core and Working Groups to help flesh out the structure and scope of CASA. The end goal for the first year will be to have in place a formal Board of Directors, which will be tasked with overseeing the development of CASA. This will include initial outreach efforts to potential philanthropic supporters, and consultation with the Development Office to map out a strategy to put CASA on a sustainable foundation.

**Year 2: Inauguration.** The second year will invite a small class of scholars (up to two per semester) to take up one-semester residencies at ESF as **CASA Inaugural Fellows (IFs)**. Potential IFs will be invited to submit short proposals for consideration by the Working Group. While in residence at ESF, IFs will be expected to work on their proposed projects, and to develop substantive collaborative efforts for teaching and research with faculty and students from ESF and SU. Year 2 will also see the inaugural **Annual Summer Adaptation Retreat (ASAR)**, to be held over a long weekend at Arbutus Lake at the Newcomb campus. A group of invited scholars, which will include ESF and SU faculty and students, will meet for three days to discuss the broad theme of adaptation, in addition to more focused topics to be selected by the Working Group. These topics will be based upon inputs from the CASA Advisors and Inaugural Fellows. Year 2 will also ramp up the formal campaign for philanthropic support.

**Year 3: Building.** The third year will invite a larger class (up to five per semester) of **CASA Resident Fellows (RFs)** for semester-long residencies, with hoped-for support from outside monies and seed grant funds carried over from previous years. Invitations will follow the protocol for selection and activities that were set in Year 2. Year 3 will also see the second ASAR, again to be held at the Arbutus Lake cabin at the Newcomb campus.

**Year 4: Launch.** Year 4 will see the formal launch of CASA. We expect that by Year 4 (end of the seed grant term), CASA will have built a sufficient base of philanthropic support to be self-sustaining. Our goal is to host on an ongoing basis at least ten RFs per semester, up to twenty at maximum. We also will have established ASAR as an ongoing event.

Reputation-building will be crucial to the success of CASA. By the fourth year, we will strive to have built a sufficient reputation to begin drawing unsolicited proposals for resident fellowships. A significant element of reputation-building will include building peer networks (supported by the Fellows), along with an aggressive media campaign, which will include “TED-like” talks by CASA Advisors and Fellows for distribution and publicity, and intensive development of educational media.

**Impact on graduate and undergraduate programs:** Given the broad scale of the phenomenon of adaptation, we anticipate that CASA will have a broad impact on programs in all departments on campus and at SU. We expect that close interaction between CASA Fellows and local

scholars will stimulate a wide range of graduate and undergraduate seminars, collaboration on development of new courses at both the undergraduate and graduate levels, and outreach through digital media to vernacular and other non-academic parties.

**Potential initial partners:** The formation of the Working Group will constitute an initial peer network of potential partners.

**Potential future partners:** Potential future supporters include philanthropic foundations like The John Templeton Foundation; the Peter Thiel Foundation; the Koch Foundation; as well as recent NSF “[Big Ideas](#)” challenges, notably “[Growing Convergence Research](#)” and “[Understanding the Rules of Life](#).”

**Impact on ESF assets:** The Development Office will be engaged to make CASA a top development priority. Dedicated office and conference spaces will be needed to support CAs and Fellows while in residence at ESF. The ASAR will require annual accommodation and transport to Newcomb for participants in the retreat. The full program will require a dedicated space on the ESF campus that can house 8-10 Fellows at a time, perhaps up to twenty, with meeting spaces and catering facilities for mid-day meals. Support for Fellows will have to include comfortable accommodation near ESF for families of Fellows.

**Reputation and global impact:** CASA will establish ESF at the forefront of an issue with ramifications for many of the intellectual, scientific and public policy questions of our time, including (but not limited to) climate change, ecosystem function and management, drivers of evolution and extinction, self-organization, complexity science, land use planning, biomimetic engineering, architecture, literature, art and others.

**New investments:** CASA will require substantial investment to be successful. There will need to be ongoing support for Resident Fellows and their families, including accommodation in the community, and establishing a physical on-campus home for CASA. This will include office and meeting spaces, as well as catering facilities for daily lunches and discussions. Reputation building will require investment in media production and outreach efforts, which may require hiring a publicity officer. Three to five new staff for administrative and logistical support will have to be hired.

**References:** **1.** Turner JS (2017). *Purpose and Desire*. New York: HarperOne; **2.** Riskin J (2016). *The Restless Clock*. Chicago: University of Chicago Press; **3.** Pigliucci M (2007). *Evolution* **61**(12):2743-9; **4.** Vincent JFV, et al. (2006). *Interface* **3**(9):471-82. **5.** Laland K, et al. (2014). *Nature* **514**(7521):161-4.; **6.** Lewontin RC (2000). *The Triple Helix*. Cambridge, Massachusetts: Harvard University Press. **7.** Gruber P (2008). *Bioinspiration & Biomimetics* **3**:1-9. **8.** Pross A (2012). *What is Life?* London: Oxford University Press. **9.** Schrödinger E (1974). *What is Life*. Cambridge, UK: Cambridge University Press. **10.** Dyson F (1999). *Origins of Life*. Cambridge, UK: Cambridge University Press.

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<sup>i</sup>Potential CAs: Anna Deplazes-Zemp, Zurich (Biomedical Ethics); Wolfgang Kerbe, Linz (Materials science); Kevin Laland, St Andrews University (Niche construction theory); Thomas Nagel, NYU (Philosophy of Science). Jan-Hendrik Hofmayr; Stellenbosch (Complexity Science, Director Emeritus of Stellenbosch Institute for Advanced Study); Jenny Sabin, Cornell (Adaptive architecture); Carlos Gershenson, UNAM (Computer science); Francis Heylighen, Vrije Universiteit Brussels (evolution, complexity, cognition, cybernetics).