The **Project on Advanced Systems and Concepts for Countering WMD** (PASCC) is run at the Center on Contemporary Studies (CCC) and sponsored by the Defense Threat Reduction Agency (DTRA). PASCC awards and supports strategic studies and dialogues that anticipate and try to reduce the threat of WMD capabilities.

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Research in Progress describes ongoing PASCC research. For more information, please contact pascc@nps.edu.

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Use of 3D Printing to Bypass Nuclear Export Controls

Performer: Kings College London
Project Lead: Grant Christopher
Project Cost: $104,486
FY16–17

Objective:

This project will assess the likelihood of 3D printers being used to circumvent existing control regimes related to the nuclear fuel cycle. The project lead will investigate the impact of additive manufacturing on nuclear nonproliferation and the possibility of using off-the-shelf 3D printers to produce parts for centrifuges and other nuclear-fuel cycle relevant components. This research will provide important information for the global arms control community and academics concerned with nuclear proliferation pathways and will be valuable for academics and industry as they seek to understand the future uses for, and the potential need for restrictions on, 3D manufacturing.

Approach:

The principle investigator (PI) will conduct a technical literature review of current 3D printer capabilities, focusing on their ability to print items for use in the nuclear fuel cycle, such as components of centrifuges, which are export controlled. This technical review will be supplemented by discussion and input from relevant fuel cycle and additive manufacturing experts. The project will use open sources to compile and publish data on the 3D printer-manufacturing base, the current location of 3D printers capable of printing sensitive items, and the availability of sensitive digital designs online, such as via ecommerce platforms and the dark web. Recent work by the PI has established that current off-the-shelf 3D printers claim to print steel at strengths that would be suitable for use in a centrifuge to enrich uranium. This development has not been discussed elsewhere in the open literature and the properties of 3D printed steel have not been explicitly examined in this context. Thus, this project will determine the possibility of using off-the-shelf 3D printers to produce steel parts for centrifuges and other nuclear fuel cycle-relevant components.