1. **Contact**  
Provide the name and contact information of the primary contact person for this IC activity. Affiliation is any entity that provides the person financial or other substantive support, for which the person may feel an obligation. If necessary, a second/alternate contact person’s information may also be provided.

**Name:** Michael Jay  
**Email Address:** michael@matchmakeredlabs.net  
**Employer:** Educational Systemics, Inc.  
**Affiliation:** MatchMaker Education Labs

**Name:** Avron Barr  
**Email Address:** avron@aldo.com  
**Employer:** Self  
**Affiliation:** Chair, IEEE LTSC

IEEE collects personal data on this form, which is made publicly available, to allow communication by materially interested parties and with Sponsors and Activity officers who are responsible for IEEE work items.

2. **Participation and Voting Model**  
Specify whether this activity will be entity-based (participants are entities, which may have multiple representatives, one-entity-one-vote), or individual-based (participants represent themselves, one-person-one-vote).

Entity-Based

3. **Purpose**

3.1. **Motivation and Goal**  
Briefly explain the context and motivation for starting this IC activity, and the overall purpose or goal to be accomplished.

The past 20 years have seen the emergence of many new tools, products, media formats, and technologies meant to support learning, education, and training. In recent years, the use of technology to support the way people learn in school, on the job, and on their own has accelerated dramatically. These technologies include learning management systems, MOOCs, authoring tools, mobile learning environments, serious games, simulations, applications of virtual and augmented reality, learning record stores, open badges, pedagogical agents (AI), online laboratories, and much more.
There is a significant engineering aspect to the development and deployment of these learning technologies that is supported by a portfolio of existing and planned standards, but that has yet to coalesce as an identified field of endeavor. While Learning Science research has generated many of these new technologies, neither the scientific community nor the instructional designers who create new learning activities offer much guidance concerning the capabilities and limitations of the underlying technologies; how to use them to accomplish instructional goals; and how to evaluate the effectiveness of both the technologies and the various pedagogical innovations they allow. Motivated by the need to provide this guidance we propose an activity on Learning Engineering whose goals are to:

**ENTER UP TO THREE DELIVERABLES HERE**

1. Represent the relationship between Learning Engineering and allied disciplines.

2. Evangelize Learning Engineering as an emphasis in allied disciplines and explore the emergence of Learning Engineering as its own discipline.

3. Convene Conferences/workshops/gatherings to cultivate a new IEEE community.

### 3.2. Related Work

Provide a brief comparison of this activity to existing, related efforts or standards of which you are aware (industry associations, consortia, standardization activities, etc.).

There are numerous activities in the IEEE LTSC, in other IEEE groups, and in other SDO’s and industry associations that develop technical standards for learning systems and that touch on applications of technology to learning, education, and training. However, none is addressing the engineering problems of designing and developing learning systems that incorporate diverse forms of learning, that must interoperate with an increasingly large stack of other technologies, and that should conform to multiple standards, potentially produced by multiple standards committees or SDOs. The continuation of the proposed IC will address this engineering problem which has become critical as learning systems and their architectures have diversified, and as such is synergistic with and will add value to the many related activities listed next (and to others not on the list):

- **IEEE Computer Society Learning Technology Standards Committee (LTSC):** multiple completed and in-progress standards activities including Learning Object Metadata (1484.12.1 – 2002); Augmented Reality (P1589, in ballot); and the current xAPI TAG.
- **IEEE Child and Student Data Governance WG (P7004, sponsored by LTSC)**
- **IEEE Personal Data AI Agent WG (P7006)**
- **IEEE Industry Connections Actionable Data Book activity (IC12-006-05, sponsored by LTSC):** An IC activity focused on the educational publishing community and a new model for tablet-based instructional content.
IEEE Standard on Networked Smart Learning Objects for Online Laboratories
- WG (P1876).
- IEEE Simulation Interoperability Standards Organization.
- The US Advanced Distributed Learning (ADL) Initiative’s Shareable Content
- Object Reference Model (SCORM); Experience API (xAPI); and their current Total Learning Architecture research project.
- ISO/IEC JTC 1/SC 36, Information Technology for Learning Education and Training. LTSC has a Category C liaison with SC36, which has a large portfolio of related standards including: Metadata for Learning Resources, ...
- US Army Research Laboratory’s work on the GIFT model for Intelligent Tutoring Systems.
- Society for Learning Analytics Research (SoLAR)
- W3C: Publishing Working Group: EPUB 3.1, Verifiable Claims, the Course community, and the newly started Educational and Occupational Credentials community
- The former Aviation Industry CBT Committee (AICC) produced a series of standards for Computer Managed Instruction including the recent CMI5 specification.
- Multiple organizations working on digital competency records, certification, credentials and badges (PESC, IMS CASE, Credential Engine, HR Open, IMS Open Badges, Medibiquitous, ...)  
- The US National Science Foundation’s Cyberlearning Program
- The new Masters of Educational Technology and Applied Learning
- Science (METALS) Program at Carnegie-Mellon University and other academic pioneers who are defining the field and training the first generation of Learning Engineers.

In addition, both the IEEE Learning Technology Technical Committee and the IEEE Education Society have contributed in several related areas and have participated in this activity.

This list is not complete. There are efforts by multiple NATO countries to re-architect military training to incorporate advanced technologies, include the US Army’s “Synthetic Training Environment” program and the US Navy’s Sailor 2025 training re-design. Many trade associations provide guidance to designers and consumers of learning technology, including the Western Cooperative for Educational Technology, the eLearning Guild, the Online Learning Consortium,
MERLOT, the Masie Consortium, EDUCAUSE, the ed-fi Alliance, and the Association for the Advancement of Computing in Education (AACE). Finally, there are several European Union projects that related direction to learning engineering (see for example, http://www.laceproject.eu/lace/, http://www.eunis.org/, https://www.geant.org/, http://www.ecis.eu/).

### 3.3. Previously Published Material

Provide a list of any known previously published material intended for inclusion in the proposed deliverables of this activity.

*Selected Learning Engineering articles published by ICICLE participants during the course of the last two years:*

“As learning and performance support technology has continued to evolve, becoming more complex and increasingly more sophisticated, eLearning and digital learning professionals working in education, enterprises, and agencies have recognized their need for new, more sophisticated skill sets. Among these are data visualization, programming and coding, and techniques from learning science and data analytics.” Learning Engineering: Making Education More "Professional" — A Q&A with Ellen Wagner, Campus Technology

“Despite exponential growth in the development of learning technologies, there has been relatively little support in terms of professional development for engineers designing, building, and deploying new learning technologies.” ICICLE: A Consortium for Learning Engineering — EDUCAUSE Review

“The learning engineer’ job title has started cropping up at several institutions, spurred in part by leadership from Carnegie Mellon University, which has a one-year master’s program in learning engineering and has hired five of its own.” Learning Engineers Inch Toward the Spotlight — Inside Higher Ed

“According to Ken Koedinger, Professor of Human-Computer Interaction at Carnegie Mellon University and chair of ICICLE’s SIG on the Learning Engineering Academic Curriculum: ‘In ten years, learning engineering will be a core job in educational technology companies, K-12 schools, colleges and universities.’” Learning Engineering: Merging Science and Data to Design Powerful Learning Experiences — GettingSmart

*Foundational Work:*


Learning, Training, and Assessments in Regulatory Compliance Thomas Jenewein, SAP Education Simone Buchwald, SAP SE
John Kleeman, Questionmark Mark Tarallo, SAP Education . 2014?


### 3.4. Potential Markets Served

Indicate the main beneficiaries of this work, and what the potential impact might be.

The increasing number of products designed to help teachers, students, administrators, and publishers can best be viewed as serving to general markets:

The Education Market:
- Schools, school districts, colleges, universities, and adult education programs (inasmuch as they develop or purchase learning systems)
- Professional education (e.g. medical, legal, ...)
- Educational technology vendors (and the suppliers of the devices and services needed to support these products)
- Educational publishers and service providers who develop, maintain, or aggregate learning technologies and systems.

The Corporate and Military Training Market:
- Training and talent management organizations (inasmuch as they develop or purchase learning systems)
- Training technology vendors
- Training content and service providers who develop, maintain, or aggregate learning technologies and systems.

There is also a growing consumer market – students, parents, and teachers who buy learning products or subscribe to online services for their own use.

### 3.5. How will the activity benefit the IEEE?

ICICLE has contributed to the awareness throughout the learning technology
and learning science communities among industry, academia, and government of the IEEE’s unique place and the significance of IEEE learning technology and data standards on the development and sustainment of the profession of learning engineering.

ICICLE’s inaugural conference brought over 200 leading thinkers in the field together and formalized a working definition of learning engineering necessary to build out the competencies of the profession and the credentialing requirements of the academic pathways that will support its development through curricula and research. The activity of this community is fostered by ICICLE and by extension, the IEEE-SA and in fostering this community, the IEEE is earning the professional trust and is benefiting from the valuable intellectual capital of the key constituent in the development of next-generation learning technologies. Already, standards activity within the IEEE LTSC is at its highest point in years. It is not a coincidence that ICICLE’s constituency of SIGs represents fields currently activated in standards activity.

4. **Estimated Timeframe**

Indicate approximately how long you expect this activity to operate to achieve its proposed results (e.g., time to completion of all deliverables).

The project is expected to continue for two more years.

**Expected Completion Date:** 12/2021

IC activities are chartered for two years at a time. Activities are eligible for extension upon request and review by ICCom and the IEEE-SA Standards Board. Should an extension be required, please notify the ICCom Administrator prior to the two-year mark.

5. **Proposed Deliverables**

Outline the anticipated deliverables and output from this IC activity, such as documents (e.g., white papers, reports), proposals for standards, conferences and workshops, databases, computer code, etc., and indicate the expected timeframe for each.

**ENTER UP TO THREE DELIVERABLES HERE**

1. Represent the relationship between Learning Engineering and allied disciplines.

2. Evangelize Learning Engineering as an emphasis in allied disciplines and explore the emergence of Learning Engineering as its own discipline.

3. Convene Conferences/workshops/gatherings to cultivate a new IEEE community.

6. **Funding Requirements**

Outline any contracted services or other expenses that are currently anticipated, beyond
the basic support services provided to all IC activities. Indicate how those funds are expected to be obtained (e.g., through participant fees, sponsorships, government or other grants, etc.). Activities needing substantial funding may require additional reviews and approvals beyond ICCom.

Normal staff support and some help organizing a conference are the only needs we see. While we are not planning any activities requiring additional revenue at the time, that may change as the activity gets underway. External funding for these activities will be obtained if required.

7. **Management and Procedures**

7.1. **IEEE Sponsoring Committee**

Indicate whether an IEEE sponsoring committee of some form (e.g., an IEEE Standards Sponsor) has agreed to oversee this activity and its procedures.

Has an IEEE sponsoring committee agreed to oversee this activity?: Yes

If yes, indicate the sponsoring committee’s name and its chair’s contact information.

**Sponsoring Committee Name:** Learning Technology Standards Committee  
**Chair’s Name:** Avron Barr  
**Chair’s Email Address:** avron@ieee.org

7.2. **Activity Management**

If no IEEE sponsoring committee has been identified in 7.1 above, indicate how this activity will manage itself on a day-to-day basis (e.g., executive committee, officers, etc).

7.3. **Procedures**

Indicate what documented procedures will be used to guide the operations of this activity; either (a) modified baseline *Industry Connections Activity Policies and Procedures*, (b) Sponsor policies and procedures accepted by the IEEE-SA Standards Board, or (c) Working Group policies and procedures accepted by the Working Group’s Sponsor. If option (a) is chosen, then ICCom review and approval of the P&P is required. If option (b) or (c) is chosen, then ICCom approval of the use of the P&P is required.

Modified baseline *Industry Connections Activity Policies and Procedure*

8. **Participants**

8.1. **Stakeholder Communities**

Indicate the stakeholder communities (the types of companies or other entities, or the different groups of individuals) that are expected to be interested in this IC activity, and will be invited to participate.
Education and training technology vendors; textbook and eLearning media publishers; corporate HR/training departments; digital platform vendors (PC, tablet, phone, VR, AR); related industry associations; educational institutions; and government agencies.

8.2. **Expected Number of Participants**

Indicate the approximate number of entities (if entity-based) or individuals (if individual-based) expected to be actively involved in this activity.

50-100 (estimate)

8.3. **Initial Participants**

Provide a list of the entities or individuals that will be participating from the outset. It is recommended there be at least three initial participants for an entity-based activity, or five initial participants (each with a different affiliation) for an individual-based activity.

Use the following table for an entity-based activity:

<table>
<thead>
<tr>
<th>Entity</th>
<th>Primary Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>MatchMaker Education Labs</td>
<td>Michael Jay</td>
</tr>
<tr>
<td>Classroom Aid</td>
<td>Jessie Chuang</td>
</tr>
<tr>
<td>IntraHealth International, Inc.</td>
<td>Jodi Lis</td>
</tr>
<tr>
<td>Yet Analytics, Inc.</td>
<td>Shelly Blake-Plock</td>
</tr>
</tbody>
</table>

As of October 2019, over 100 people have contributed to 8 ICICLE Special Interest Groups. ICICLE has 65 entity members and over 600 people subscribe to ICICLE’s mailing list. Over 200 people attended ICICLE’s inaugural conference on Learning Engineering.