Thesis Contributions in a Nutshell

The research in this thesis is motivated by the philosophy of advancing computing research for society [societal challenges — research challenges]. Specifically, this thesis focuses on extending and applying ideas from computing and software engineering towards design of educational technologies for scale and variety in the context of adult literacy in India [287 million learners, 22 Indian languages, varied instructional processes, content]. The research undertaken in this thesis has broadly contributed in the following directions:

Research/Publications

- How to systematically model different aspects of Instructional Design to facilitate design of educational technologies? - **Patterns** [IJAE 2017, ICALT 2014], **Ontologies** [ICALT 2013, ICALT 2012], **Systematic structures** [T4E 2012, ANQ Congress 2011], **Tools** [CHI 2013, ICALT 2013]

- How to reduce effort during design of educational technologies for large scale & variety? **Systematically organize instructional material** [T4E 2012], **Apply Software Product Lines** [ICALT 2012, ICALT 2013, PLEASE 2013 @ ICSE 2013]

Research/Standards & Industry - To the following standards in ISO/IEC JTC1/SC7 - Software and Systems Engineering as Co-Editor [ACM SIGSOFT SEN May 2016]

- ISO/IEC 26552, product line architecture design, work-in-progress since 2014
- ISO/IEC 26553, product line realization, work-in-progress since 2012
- ISO/IEC 26554, product line verification and validation, since 2012

- “A Reference Model for Design of Educational Technologies – Quality, Scale and Variety”, a proposed draft standard based on my PhD thesis for Indian Committee of ISO/IEC SC36 [Information Technology Information technology for learning, education and training]

Practical Impact & Open Source Software
• The prototype software developed as part of this thesis is available at http://rice.iiit.ac.in

• The mobile version of the generated software is deployed on Google Play Store and is available at https://play.google.com/store/apps/details?id=iiit.rice.al.telugu

• The software/app is listed in the official websites of Department of Adult Education of Government of Telangana at http://tslma.nic.in/ and State Resource Center, Government of Telangana at http://srctelangana.com/

Societal Impact

• Recommendations on (i) quality of education (ii) rapid development of educational technologies as Special Invitee, Steering Committee, Education, Planning Commission of India, headed by Prime Minister of India, 2011

• Designing Technologies for 287 million adult learners, Thesis presentation to the team headed by Director General, NLMA, the highest authority for adult education in India and the Chairman of Central Board of School Education (then).

• The research done in this thesis was appreciated and all state directors were instructed to experiment with our work on the field | Collaborating since June 2016