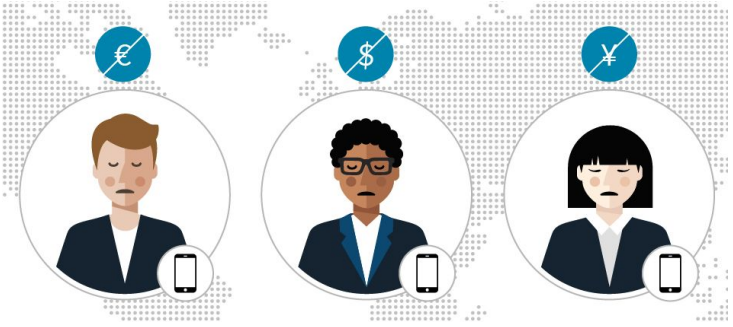

Tutellus
通过教育 武装大脑
www.tutellus.io
v 3.25

索引

愿景

教育是一笔未来的资产



在过去的一千年里，人类几乎没有对教育作出改善。最重要的是，目前还没有任何教育模式可以让人在赚钱的同时学习。相反，人们不得不对自身的教育进行投资，同时期望在长远的未来赢回这笔投资。

在我们看来，教育主要面临四个问题：

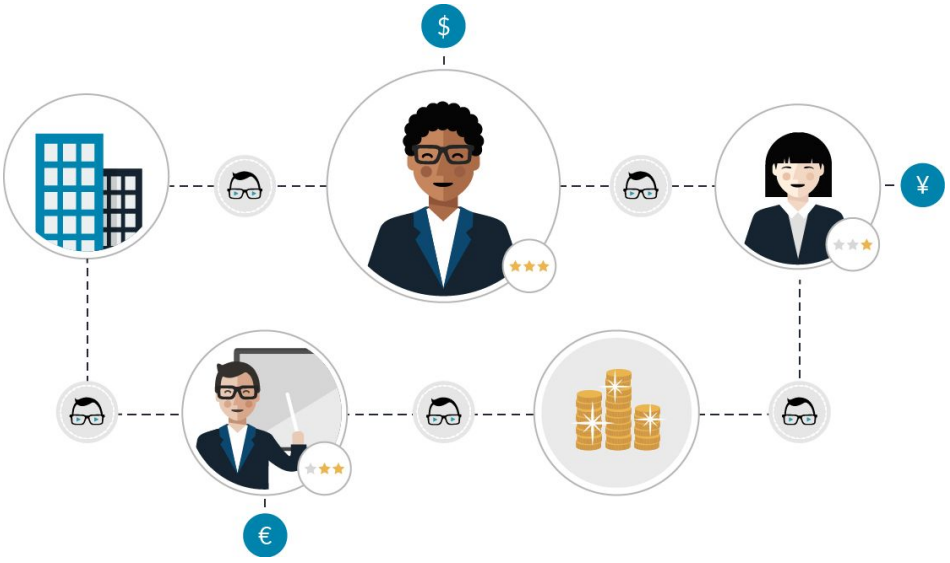
1. 人们在学习时不仅无法挣**钱**，反而需要花钱。
2. 学生往往因缺乏**动力**而停止学习。
3. 教师无法就其学生创造的**价值**而获利，教师的付出与回报不成正比。
4. **就业**和教育之间存在巨大的鸿沟，数百万工作岗位缺乏合适的人才。

Tutellus.io:新典范

为了打破这一现状，Tutellus推出了新的师生关系范例，通过建立一个新的分权体系来强化学生与教师对教育的投入。Tutellus**会给予努力学习的学生以报酬**（学习证明），**也会根据学生所取得的成功给予其教师给予以相应的报酬**（教学证明）。它是首个实现这一功能的教育平台。

Tutellus以极其简明的方式解决了前面所描述的若干问题。

1. 学生既可以边学习边挣**钱**，也不必付钱。
2. 学生会有帮助他人学习的**动力**。
3. 当自己的学生取得成功时，教师本身也会从教学事业中获得更大**价值**。
4. 公司企业可以通过更高效的匹配流程来招收优秀**员工**。



Tutellus创造了一个生态体系，让学生和教师都可以根据其在平台上的行为和活动来挣钱。同时，Tutellus也为所有中介（学生、教师、公司等）提供了新的资源、商机、候选人以及服务。

区块链可以用作扶贫帮困的工具

区块链最为人所知的用途即用于支持比特币和其它加密数字货币。不仅如此，区块链也是Tutellus所提出的新的教育典范中的关键技术。有了这一技术，该典范才能高效实施。这一新体系的核心即对数字资产**或代币**的创建与管理。而这也构成了一个新的学生与教师奖励体系的基础。

我们的平台将衡量学生与教师的投入度，以及他们在该平台提供的教育价值，并通过内部STUT代币来衡量他们的**关联度**。这一系统还包括与交易、管理和访问相关的一些功能。

为使这一创新项目取得成功，Tutellus贡献了以下三大要素：

1. **商业模式**：自2013年起运作至今；是由一百万名用户和十三万个视频课程组成的庞大社区。
2. **平台**：根据用户的行动和贡献向其支付酬劳。
3. **应用**：通过应用区块链技术来完美满足线上教育市场的需求。

1. 简介

2016年时，线上教育市场价值1650亿美元。然而，它在满足世界各地人们的教育需求方面仍十分低效。

尽管就业市场每年产生约10亿份合同，目前仍有超过300万名应届毕业生找不到工作。在欧洲，工作的供需失衡比例大约为80%，对技术行业的影响尤为严重。因此，人们愈发认为教育机构完全不了解用人单位的需求。

另一方面，发展中国家有数以百万计的无业人员，他们渐渐学会了用手机上网。如今他们可以加入教育平台。然而，这些教育平台都需要用户对教育进行投资，这对低收入人群来说是很难接受的。

当前市场所面临的诸多重大挑战不再是传统教育模式所能够解决的。我们需要找到新的应对方法。

2. 问题

2.1. 贫穷、缺少工作机会

在发展中国家，有数以百万计的受过训练的工人，他们缺少的只是工作机会。他们能找到的都是不稳定或工资很低的工作，甚至生活水平在贫困线以下。

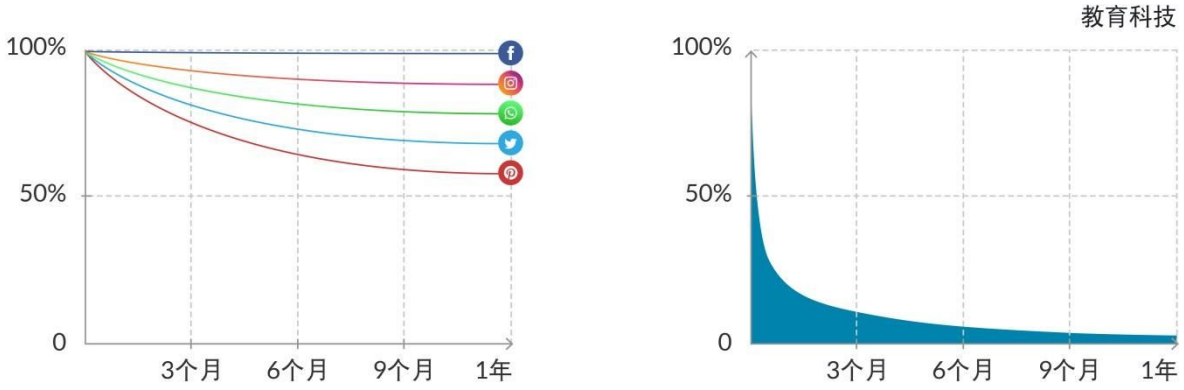
在一些发展中国家中，手机的普及率已接近欧美发达国家。在这些国家里，人们如今也能够上网了。通过互联网，Tutellus可以帮助低收入人群脱贫。

这类人群渴望挣钱，也渴望边挣钱边学习新技能。

2.2. 学生缺乏学习动力

学习需要努力也需要动力。

所有教育技术平台目前都存在低转化率和低用户保有率的问题。比较这些平台和其它社交平台（比如商业或休闲平台，如社交网络和短信服务等）的用户参与度——即某项服务的平均使用频率——我们会发现用户行为的差异非常大。主流社交平台的月均用户参与度高达80%，而教育平台的用户参与度从长远来讲则低得多，只有约5%~10%。



社交平台与教育技术平台的用户参与度对比

这一问题不只局限于某一家公司或某一种商业模式，而是一个恒久的隐性特征，影响着整个行业。对于任何平台而言，参与度越低，意味着社交关系越少，每个用户所带来的收益也就越少。因此，整体而言，这一行业需要更大的营销投入，来吸引新的用户，实现可持续发展。

参与度低的主要原因是学生缺乏学习动力。无论是线上还是线下学习，都需要全身心的投入，甚至牺牲，也需要相当大的金钱投资、努力和时间付出。同时，学生可能会怀疑其所学课程是否符合期望。他们或是担心培训的质量不够高，或是认为培训可能无法帮助其找到好的工作。

2.3. 教师缺乏教学动力

教学远非轻松简单之事。我们大部分人应该都还记得我们最尊敬的教师，以及他们对教学工作的付出。但这种付出很少得到认可。很多时候，好的教师工资并不比别人高，而他们的优秀工作很少得到认可。因此，好的教师也会失去教学动力，从而导致教学质量下滑，
学生所受的培训质量降低，工作机会也就越来越少。

对于教师而言，教师优秀与否几乎不体现在工资待遇上。目前还没有高效的机制可以来衡量最优秀的教师们的努力付出与奉献。这不仅减弱了教师的教学动力，还直接影响了学生所获的教育质量。

高效的教育体系应当根据学生的成绩来奖励教师。这里指的成绩主要可通过分数、参与度及就业情况来衡量。

2.4. 与就业市场关联度低

教育还面临着另一个难题，即学历与文凭证书的价值正日益减少。在21世纪初以前，学历与文凭证书始终是教育体系的核心。如今，学历与文凭证书的市场价值正在降低，因为在当今的新体系中，衡量个人价值的标准已不再是分数，而更多的是工作经验、项目的实际参与经历，以及工作契合度。因此，就业市场对教育的整体价值定位正在发生着重大的变化。

与此同时，很多行业（尤其是IT行业）都需要大量受过良好培训的工人，但用人单位却很难招到合适的人选。我们仍需要教育来填补供需之间的缺口，但就目前而言，正规教育并不能满足市场的需求。

教育与市场需求的脱节产生了一种恶性循环：公司企业与教育行业越来越疏远，导致教育与就业市场之间的分歧越来越大。

显然，我们需要有新的工具和系统来培训并识别最适合特定岗位的特定人才。

3. 解决方法

3.1. Tutellus.io目标

Tutellus的主要目标是创建一个新的教育模式来应对市场的挑战：培养和辨别认真学习的学生，提高优秀教师的投入度，并将教育界（学生和教师）与就业市场紧密相连。

通过给予报酬和匹配就业来帮助人们脱贫

请设想，如今有这样一个可以帮助人们脱贫的平台。Tutellus计划为一些正为就业而努力学习的学生用户提供部分教育资助。

为学生实现增值

请设想，如今有这样一个可以对优秀学生的参与进行奖励的平台。其中的逻辑很简单：学生获得的培训越优质，该学生对教育界和公司企业（用人单位、职业介绍所和其它服务机构）的价值就会越高。学生的价值提高了，受益范围也会延伸至教育平台以外：用人单位甚至整个社会都会受益。

为教师实现增值

请设想，如今有这样一个平台，它可以基于学生的优秀表现对其教师进行奖励：学生与教育平台和就业市场的关联度越高，他们的教师所得的奖励就越高。提高学生的关联度会给教师带来教学动力，长此以往，学生的学习动力会大大提高，教师对学生的奉献度也会提高。

为正在招聘人才的公司实现增值

请设想，如今有这样一个平台，可以帮助公司找到完美契合某个岗位或某份合同的人才。该平台通过创建一个良性循环来激励所有教师与学生，从而帮助提高学生与公司等用人单位的契合度。通过评估学生在某一特定习得技能方面的价值，公司可以找到潜在的理想人选。

在庞大的学生群（超过一百万名学生）和教学材料（超过13万个视频课程）的基础上，Tutellus将成为首个分权式教育技术平台，通过采用区块链技术来应对教育行业所面临的诸多挑战。区块链可以实现数字资产（或代币）的创建，而这正是Tutellus社区新型激励体系的核心部分。

3.2. 代币体系

Tutellus的愿景即：通过新颖的教育模式来建立新的激励机制，让所有用户都能根据自身带给社区的价值而获得直接回报。

如今，通过使用区块链技术，尤其是NEM技术，我们已经可以实现这样一种模式。

该奖励体系将通过数字资产或代币来建立，后者将构成市场的核心。整个体系将根据智能合约的规定来运行，从而保证整个平台的完全数字化和自发操作性。

将来，这一代币体系还可用于更多用途：可以用作购买产品和服务的货币，用作衡量任一技能相关度的工具，用于设立平台的管理模式，用于与其它代币互动，等等。

该模式使用两种不同的代币：TUT和智能TUT（即STUT）。

TUT将作为平台货币并用于与其它平台和货币的互动

智能TUT(STUT) 不直接用作法定交易货币，但可以用于奖励对平台做出教育贡献的用户，也可以用于衡量他们的参与质量。

用户可通过多种方式赢得STUT，而这些方式都与学习或帮助他人学习有关。我们可以通过一位用户所持有的STUT代币数量来衡量该用户对此平台的关联度和重要性。此外，还会有另一个奖励机制用于奖励持有大量STUT代币的用户。

STUT代币可部分用于兑换TUT代币，或存于用户的虚拟钱包内，作为衡量用户与平台关联度的一个指标。长远来讲，这会带来很多好处（比如通过工作匹配，公司可以招到更好的员工；寻求影响力或好商机的公司也将从中受益，等等）。用户无法直接购买STUT，STUT只能通过用户在平台上的行为来挣得。

TUT代币有什么用途？
TUT代币的发放数量有限，可用于获得多种服务：

- 购买课程，包括从某些难以使用法币的国家购买课程：委内瑞拉、古巴、津巴布韦等
- 课程折扣：只有用代币购买才能享受课程折扣
- 捐赠服务：只能通过代币获取
- 教师服务：只能通过代币获取
- 面向公司的服务：只能通过代币获取

TUT和STUT都将分配给平台上的学生和教师，这样一来，从一开始就会有活动产生。我们的平台社区有将近一百万名教师和学生，他们将是我们最大的财富，也将在平台的发展壮大中扮演关键角色。

	TUT	STUT	例子
代表什么？	产品和服务的获取途径	与社区的关联度	一个价值30欧元的课程可以用TUT代币来购买，它的关联度即3000STUT。
如何获取？	在平台内部或外部获取	只能在平台内部获取	获取TUT代币的方式有多种STUT只能通过学习来挣得
使用途径？	交易、捐赠、管理	表示关联度，获取福利、工作匹配	TUT代币在平台内作为货币使用。STUT代币表示关联度，且能带给用户额外收入。
代币的价值如何？	波动	1欧元 = 100 STUT	TUT的价格取决于供需定律。STUT的价格始终是0.01 欧元。

TUT代币可作为一种完全交易代币，其用途包括但不限于：

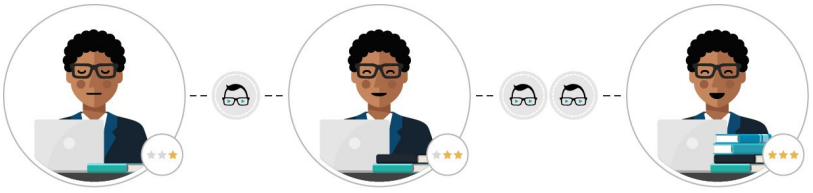
- 购买平台上的任意产品
- 购买服务，如教师的推销和营销，获取学生资料及其它第三方服务
- 获得由第三方捐赠所资助的奖学金计划
- 影响与关联度相关的管理决策：比如批准课程、职业规划、教师、导师和总管理等
- 转账给他人，可以是平台内部或外部

学生、教师和公司可通过多种方式获得TUT代币：

- 在首次代币发售时或通过赏金计划进行购买
- 通过Tutellus的奖学金计划获得：Tutellus的奖学金计划旨在奖励表现最优异的学生
- 通过获取第三方支付的现金份额（比如用人单位为找到最优异的学生而进行的支付所产生的收入）
- 通过忠诚计划（参见3.8章节）
- 通过交易第二代币，即STUT

3.3. 为学生实现增值

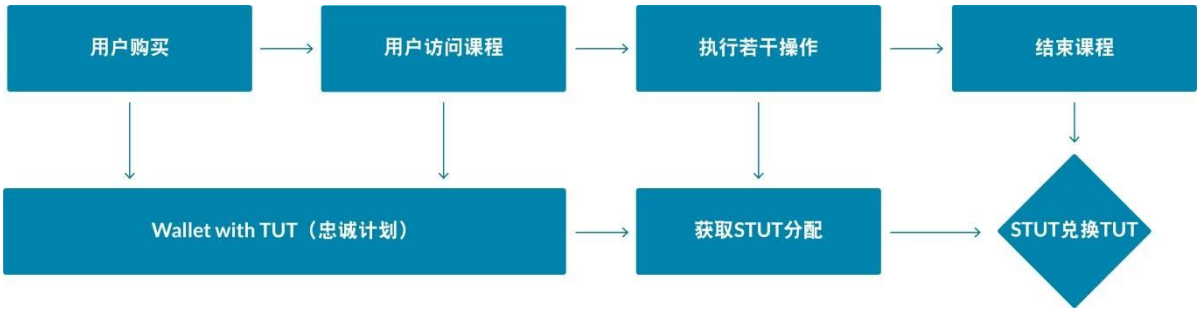
每个课程都会有一个固定的法币价格以及TUT代币价格。TUT代币价格是基于课程的TUT价值的，用TUT代币购买课程的用户可享受九折优惠。每个课程还会有一定数额的关联STUT代币，具体数额取决于课程价格和时长。学生顺利完成一个课程后可以获得STUT代币，具体数额取决于他们对社区的贡献价值。我们会落实一个完整的奖励体系来鼓励用户进行和参与活动。



这个奖励体系采取分权制，由用户自己来决定其对社区的贡献度。值得奖励的行动包括：

- 提出与课程主题相关的、有见地的问题
- 合理地解答其他同学提出的问题
- 将所教内容应用于实践
- 顺利通过考试
- 提交项目及相关内容
- 通过量规系统参与对其他同学的评估
- 参与辅导其他同学
- 检视课程、评价课程、提供能帮助教师和Tutellus改进的反馈建议

每个行动对应一个STUT代币值，用户都会知晓这些代币值。用户最终获得的总的代币值就可以用于衡量用户在这个学习过程中所付出的的心血、贡献以及努力。一个课程所能提供的最大的STUT代币数量是该课程的欧元价格的100倍。因此，一个估价为13欧元的课程就会有1300 STUT代币。



完成一个课程后STUT代币（关联度）的流动

STUT代币可用于量化用户与平台的关联度，但STUT代币不能直接用于交易。 所以说，STUT代币的作用实际是让用户在顺利完成一个课程后获得相应的代币。当课程完成并关闭之后，学生可将一半的STUT代币用于兑换TUT代币，兑换后的结果将通过一个智能合约储存在区块链内。

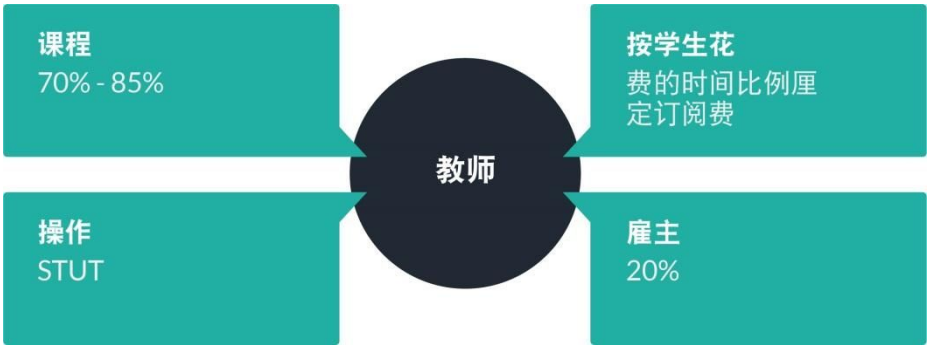
3.4. 为教师实现增值

目前，Tutellus平台上的教师主要有两方面收入来源：

- 首先，学生购买课程并付款后，教师会获得其中的 70%~85%。
- 其次，教师会从学生的订阅服务费中获得一笔收入。订阅服务费是学生为了访问Tutellus内容而支付的一笔统一费用。教师从这笔收费中获得的份额多少取决于其学生在课程中所花的时间。花费时间越多，教师获得的份额则越多。

通过执行这一套代币系统，Tutellus将成为第一个对教师直接进行绩效奖励的平台。该平台还会通过另外两个收入流对教师进行奖励，奖励多少取决于教师对系统的价值贡献。

- 教师通过在课程中认真教学，如回答学生问题、评价项目等，可以获得更高的关联度，而关联度是通过STUT代币来衡量的。教师可以将部分STUT代币用于兑换TUT代币，这与学生的代币兑换机制相同。
- 此外，如果一家公司使用Tutellus招到了适合某一岗位的学生且该学生是通过某位教师的课程学习而习得该工作岗位所需的技能的，则该教师将获得该公司向Tutellus支付费用的20%。



教师可从多达四个不同收入源获得收入

这些收入源都会增强教师的教学动力，教师的付出和奉献反之也会提高最终产品的质量。本系统是分权制系统，对于学生和教师都是如此。贡献的大小最终都是由平台社区成员来衡量的，对教师的奖励的多少也是由他们决定。

在这个新模式中，另一重大创新点即教师酬劳的支付方式：

即时支付

整个平台都采用代币来运作，也就是说使用代币，而不是法币，来实现即时支付，这极大地改善了对教师的结算方式。

即时支付这一功能会给市场带来巨大冲击，因为目前还没有其它的教育技术平台能对教师进行即时报酬支付。目前，行业一般标准为延迟60 ~120天付款。通过改善付款方式，Tutellus有望吸引到最优秀的教师来加盟。

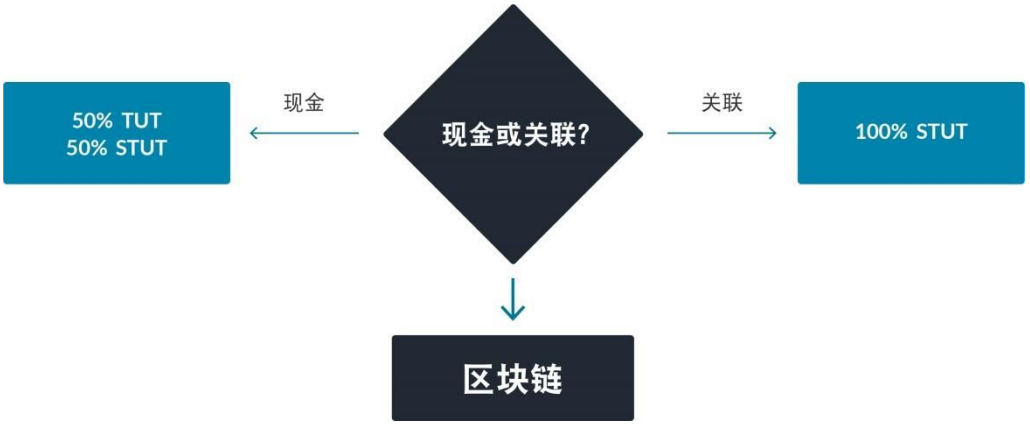
3.5. STUT兑换TUT

通过STUT代币兑换TUT代币能够将用户与平台的关联度以货币的形式体现出来，因为 TUT 代币可以在平台上消费使用。顺利完成一个课程后，用户即可将从课程中挣得的STUT代币中的一部分（最多50%）兑换成TUT代币。

这种兑换并不是双向的：持有TUT代币的人无法将TUT代币兑换成STUT代币。在这个平台内，名望与关联度只有通过积极参与方能挣得，而不能被购买。

STUT兑换TUT这一决定是由相反的两方面作用力产生的。

- 将对平台的贡献价值进行兑现的意愿；以及
- 在平台内持续提高名望及关联度的意愿（名望与关联度是由STUT代币来衡量的，且长远来讲会给用户带来利益）。



用户（教师或学生）可根据自身喜好用STUT代币兑换TUT代币。

一个课程的STUT代币总数等于该课程欧元价格的100倍整数，且价值相当于该课程价格的100%原价。因此，欧元与STUT之间的汇率固定为1:100。另一方面，由于TUT是可交易的代币，其价格将由供需规律来决定。

之所以将STUT代币作为衡量Tutellus学生用户关联度的唯一指标，是因为我们希望奖励那些选择持有STUT的用户，而不是那些将STUT代币兑换成TUT代币的用户。最终的目的是鼓励用户对平台的持续投入，而非兑换为即时、短期的利益。

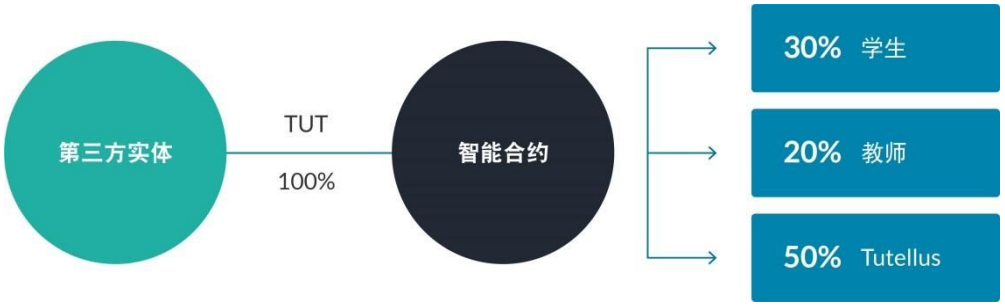
3.6. 公司及第三方访问

学生的关联度（通过STUT代币来衡量）可以量化体现他们对具体技能的掌握情况。与某个工作岗位关联度最高的学生会吸引到正在招聘人才填补空缺职位的公司和第三方的注意。这些优秀学生的知识水平都已得到了检验和提升，具有一定影响力。通过购买TUT代币，公司即可访问最优秀学生的资料信息。

公司为了访问最适合某些工作岗位的学生的资料信息而支付的TUT代币会根据智能合约进行如下分配：

- 30%分配给资料信息与岗位相契合的学生
- 20%分配给与这些学生相关联的教师
- 50%分配给Tutellus

这些公司和第三方所支付的价格将取决于供需定律。例如，在本文截稿时，为访问Solidity开发员人才资料而需支付的价格要高于为获取卓越专家人才资料而需支付的价格。



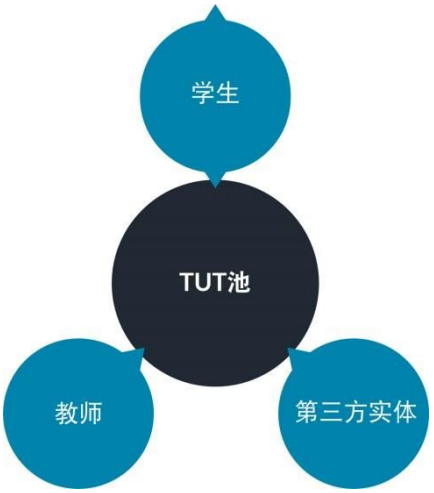
第三方机构获取服务时的利益分配

3.7. 奖学金、基金会及非政府组织

我们通过两种补充方式将奖学金（及TUT代币）分配给学生。

- 利益最大化：我们会将第三方利益与目标学生相匹配（例如，有家公司正在招聘区块链开发员，我们会根据关联度将潜在的具有区块链开发技能的学生推送给该公司）。这样一来，我们就将供需相匹配，满足了一个市场需求。
- 社会影响最大化：我们会帮助来自发展中国家的具有高关联度的学生，目的是为了帮助其学习、挣钱并引导他们掌握最为市场所需的工作技能。

我们的TUT代币池的输入流来自于用加密货币进行支付的教师、第三方机构和学生。



TUT奖学金池里的TUT代币来自：用加密货币购买课程的学生、购买服务的第三方机构和教师。这些奖学金将会分配给关联度最高（即持有最多STUT代币）的学生和教师。

此外，为了切实提高发展中国家的教育水平，我们将与基金会和非政府组织共同发起一个奖学金计划。

面向贫困学生的奖学金计划

Tutellus将授权允许任何用户和公司将奖学金分配给世界上任何地方的任何人（一个或多个），以便其免费学习（且边学习边挣钱）。

为实现这一计划，我们将与若干非政府组织进行洽谈（以期利用其影响力来推广这一计划），我们的最终目标很明确：

- 确保任何用户都有权将奖学金授予世界任何地方的任何人（直接授予或授予团体）；以及
- 确保任何公司都有权将奖学金授予某一自定义目标人群（可以是任何学科或技能），以便其边学习边挣钱。

由于货币具有绝对的可追溯性，我们的这一模式是透明的，确保了代币和课程均能被需要的人或人群获得。

3.8. 忠诚计划

为了奖励平台用户的忠诚，课程价格的5%~10%将以TUT代币的形式发放给购买课程的所有学生。每名学生收到的具体代币数额取决于他们与平台的关联度（由STUT代币来衡量）。

与其它交易一样，这些奖励代币也会通过智能合约来部署。

4. 代币经济

4.1. 功能

以下章节将详细介绍代币在平台内的流动。

学生：

- 一名学生购买了一个课程或平台内的其它任何产品。由于这是一个付费课程，根据忠诚计划，该学生获得了一定数额的TUT代币，最高为课程价值的10%。
- 当该学生学习该课程时，及其参与的互动为平台带来增值时，该学生就有机会获得一定数额的STUT代币。当学生完成该课程，学生就可以将一半的STUT代币用于兑换TUT代币。
- 一名学生获得了Tutellus授予的奖学金，可以免费或以优惠价享受服务。
- 一名学生获得了某第三方授予的TUT代币，该第三方正在为某个工作岗位招聘最优秀的学生人选。

教师：

- 一名教师创建了一个课程并将这一额外价值贡献给了社区，于是社区授予该教师一定数额的STUT代币。该教师可以将这些STUT代币的一部分（最多50%）用于兑换TUT代币。
- 一名教师从购买课程或相关服务的学生（用法币或TUT购买）处获得了间接收入。
- 一名教师从正在面向学生进行招聘的公司处获得了TUT代币。
- 一名教师用TUT代币在Tutellus平台内兑换额外服务。

正在招聘的第三方组织：

- 一家正在面向学生进行招聘的公司将一笔TUT代币发送到平台的TUT池内，以期访问平台上最优秀的学生资料信息——即在各个技能集里关联度最高的那些学生的资料信息。
- 与所需技能关联度最高的学生（持有最多的STUT代币）将获得公司支付的TUT代币中的30%（在这些学生内部平均分配）。
- 这些学生参加过的课程的任课教师将获得公司支付的那笔TUT代币中的 20%（根据关联度在教师中进行分配）。
- 最终，50%的代币将返回到Tutellus池内部。

Tutellus:

- 将来自第三方机构和平台奖学金的TUT代币发给学生。
- 将STUT代币发给学生和教师，用于衡量关联度。
- 将TUT代币发给学生和教师，作为STUT代币的兑换物。
- 通过忠诚计划将TUT代币发给学生。
- 从教师处获得TUT代币，作为平台服务的费用。
- 从正在寻找最优秀学生人才的公司和第三方机构处获得TUT代币。
- 从付费服务中获取一定的佣金（法币及TUT代币）。

任何时候，任何参与者都可以在平台外部交易TUT代币。但STUT代币只能在平台内交易，且只能兑换TUT代币。关于STUT代币兑换 TUT代币的限制前文已经有解释。

4.2. 代币分配

在最初分配代币时（参见9.2章节），一部分的代币会分给尽可能多的人（学生和教师），尤其是平台上最活跃的用户。 首次代币发售(ICO)结束后，代币交易就开始了。

- 在最初的代币销售时，会提供6000万个代币。如果在销售时有应用折扣，还会额外发行最多3000万个代币。ICO结束后就不再发行新的代币了。
- 1000万代币会发给团队（保留期一年）。

- 1000万代币会发给顾问、公关等人。
- 2000万代币会保留在代币池内，以激活生态体系。

4.2.1. 起始助学金

首先，奖学金会授予平台上最活跃的用户。我们会利用之前三年就已开始执行并监控的指标来决定哪些用户将获得起始助学金。这些用户将获得一笔初始STUT代币作为助学金。关于具体分配额度，附件 2.5中有具体说明。我们的TUT代币奖学金会优先照顾经济困难的国家。

4.2.2. TUT代币流态模式

通过使用现金流态模式的方法，我们可以开发出代币池输入与输出的流态模式。

开始时，我们会把大量TUT代币奖学金分配出去，让学生使用这些代币免费学习。这样也能够提高其他学生的活跃度和学习动力。活跃度提高了，学生就会用代币来购买课程，
教师和第三方机构就会用代币来购买服务：最终就会产生代币输入流，流入代币池中。

代币输出：

- 助学金： 约12%的活跃学生会获得助学金，首先取决于其活动和用户类型，其次取决于关联度。
- STUT兑换TUT：
    - 学生会从免费和付费课程中获得代币。我们会将完成免费课程的学生（约5%~30%的免费课程学生）和完成付费课程的学生（30%~100% 的付费课程学生）区分开来。这里我们假设30%是为了便于构建模式。
    - 无论哪种情况，都会有约70%~30% 的学生将STUT兑换成TUT。随着来自公司的收入增加，这个比例会逐渐减少。这是因为：当公司收入可能会增加的情况下，学生想要持有STUT代币（作为其关联度的一种标志）而不是将STUT代币兑换掉。
- 这两种输出最终都会使每季度的活跃用户数量上升，从而增加免费课程转付费课程的用户数量及交易总数。
- 忠诚计划：当学生购买一个课程时，该课程价格的5%~10%会以TUT代币的形式返还给该学生，以便学生日后继续购买。

代币输入：

- 在平台内用代币去购买任何产品
    - Tutellus目前的用户转化率为2.40%，意味着有2.4%的活跃用户是季度付费用户。我们在2018年第一季度大概会有35万名学生来自一些不太发达的国家。这些国家目前还难以使用法币进行线上购物。也正是在这些国家，我们预期会有最多的学生来使用 TUT 代币购买课程。随着时间的推移，随着代币被越来越多的用户使用，我们预计转化率会从最低的0.5%逐步增长到6%。

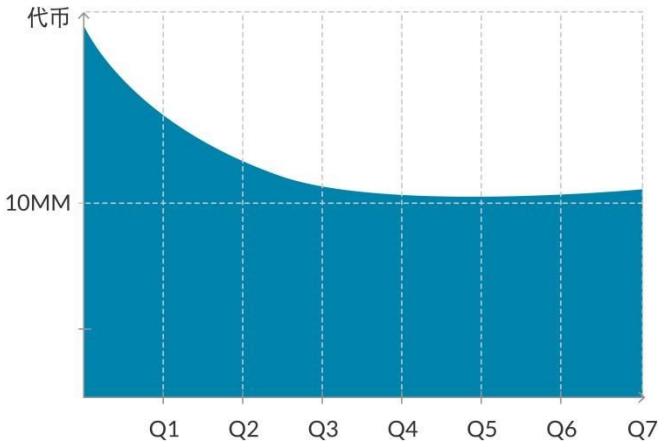
- 给教师的服务
    - 根据帕累托 (Pareto) 法则，我们预计会有5%~20 的教师有兴趣通过我们的多种服务（赞助课程、主页、电邮营销、手机广告、推送App等）来推销他们的课程。
    - 每名教师每季度的平均收入估计将在200到500美元间。教师只能通过TUT代币来获取这些服务。

- 给公司的服务
  - 根据我们预估的已被地理定位的学生人数以及工作空缺，每季度大概会有10到400家公司有兴趣购买我们的服务以便访问相关资料信息（比如工作机会、商机、具有影响力的人等等）。
  - 我们每季度会向这些公司收取平均2000美元的费用。这些公司目前支付给中介的报酬是被录用人选年薪的20%。
  - 这些服务只能通过TUT代币购买。

如下表所示，代币的分布会有瀑布效应，代币池在第一年年底又会填满。我们的目标是将代币池稳定在约1亿个代币。如果代币池内的代币数量超过1亿（正如预测模型所示），助学金的数量就会随之增加，以鼓励用户之间的活动。

	2018				2019			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1 - 输出代币	-501	-1,444	-2,891	-5,792	-7,265	-8,761	-9,936	-14,915
2 - 活跃学生 (QAU)	100	200	400	800	1,200	1,800	2,700	4,050
3 - 免费交易	200	400	800	1,600	2,400	3,600	5,400	8,100
4 - 已完成免费课程百分比	*5%*	*7%*	*10%*	*15%*	*20%*	*25%*	*30%*	*30%*
5 - 法定货币支付交易	2	5	12	32	60	99	162	243
6 - % 兑换率	*2%*	*2,5%*	*3%*	*4%*	*5%*	*5,5%*	*6%*	*6%*
7 - 免费代币交易:	0	24	48	96	120	144	162	243
8 - % 获得奖学金的学生百分比	*12%*	*12%*	*12%*	*12%*	*10%*	*8%*	*6%*	*6%*
9 - 奖学金代币:	-500	-1,440	-2,880	-5,760	-7,200	-8,640	-9,720	-14,580
10 - 奖学金价值（美元）	250	720	1,440	2,880	3,600	4,320	4,860	7,290
11 - 代币交易选择	-1,1	-3,1	-8,8	-26,2	-52,6	-98,6	-177	-269
12 - 有交易选择的学生百分比	*70%*	*65%*	*60%*	*55%*	*50%*	*45%*	*40%*	*30%*
13 - 用户保有计划	-0,3	-1	-2	-6	-12	-22	-39	-66
14 - 输入代币:	**73**	**257**	**742**	**1,890**	**3,955**	**7,728**	**14,175**	**25,702**
15 - 代币支付交易	2	5	16	42	95	189	354	638
16 - 无法定货币用户	350	525	1,050	2,100	3,150	4,725	7,088	10,631
17 - % 购买的学生百分比	*0,5%*	*1%*	*1,5%*	*2%*	*3%*	*4%*	*5%*	*6%*
18 - 已交易的代币	52,5	157	472	1,260	2,835	5,670	10,631	19,136
19 - 教师	1	2	3	5	7	8	10	12
20 - 进行促销的教师百分比	*5%*	*10%*	*15%*	*20%*	*20%*	*20%*	*20%*	*20%*
21 - 课程	3	6	9	14	16	19	23	28
22 - 平均票价（美元）	200	250	300	350	400	450	500	550
23 - 已交易的代币	20	100	270	630	1,080	1,458	1,944	2,566
24 - 公司					*10*	*100*	*200*	*400*
25 - 平均票价（美元）					2	3	4	5
26 - 已交易的代币					40	600	1,600	4,000
27 - 代币数额净变化	-428	-1,187	-2,149	-3,902	-3,310	-1,033	4,239	10,787
28 - 池状态	19,572	18,385	16,236	12,334	9,024	7,991	12,230	23,017

代币流态模式（数字以千为单位）



TUT池状态随时间的变化

术语表

1.	**输出代币：**	**Tutellus平台分配出去的TUT代币**
2.	活跃学生 (QAU)：	DApp中的季度活跃用户
3.	免费交易：	由活跃用户在此期间进行的免费交易
4.	% 免费课程已完成：	已顺利完成的免费课程所占的百分比
5.	法币支付交易：	使用法币（如美元、墨西哥比索等）进行支付的课程
6.	% 转化率：	购买非免费产品的学生所占百分比
7.	免费代币交易：	学生通过免费课程挣得的代币
8.	% 奖学金的学生：	使用奖学金来学习课程的学生所占的百分比
9.	奖学金代币：	通过奖学金授予的代币
10.	奖学金价值（美元）：	奖学金的美元价值
11.	代币兑换选项：	用代币兑换关联度
12.	% 执行代币兑换的学生：	兑换TUT代币的学生所占百分比
13.	用户保有计划：	通过忠诚计划授予的代币
14.	**输入代币：**	**Tutellus平台接收到的TUT代币**
15.	付费代币交易：	使用法币支付的课程
16.	非使用法币的用户：	使用TUT代币购买产品的用户
17.	% 购物的学生：	使用TUT代币进行购物的活跃用户所占的百分比
18.	已交易出去的代币：	来自TUT代币购物消费的代币
19.	教师：	在此期间的活跃教师
20.	% 进行促销的教师：	购买服务（促销/营销）的教师所占的百分比
21.	课程：	平台内的活跃课程的数量：
22.	平均每次消费金额（美元）：	教师每季度平均每次服务消费的金额
23.	已交易出去的代币：	教师为使用服务而购买的代币
24.	公司：	每季度购买服务的公司的数量
25.	平均每次消费金额（美元）：	每家公司平均每次消费的金额
26.	已交易出去的代币：	公司购买的代币
27.	**代币数额净变化：**	输入 — 输出
28.	**池状态：**	池状态：先前状态 + 输入 - 输出

4.2.3. 储备金

平台的代币池实际上是平台储备金的一部分，平台储备金包括ETH（以太坊，来自融资）以及TUT代币（来自代币池）。代币池约占所有TUT代币的总价值的 20%。储备金的目的是为了稳定代币的价格。为此，我们可以使用储备金来卖出或买入代币。

4.3. 代币管理

代币货币政策将根据以下商业规则进行管理：

4.3.1. 关联度的相关信息

- 关联度是通过STUT代币衡量，并与通过树形标签预先定义好的微技能相关联的。
- TUT代币的价格是根据供需关系确定的，而STUT代币的价格则是与欧元相关联。1欧元 = 100 STUT
- 最初，我们的STUT池的大小是TUT池的十倍（10亿个STUT）。首先，根据Zipf 定律与Pareto定律（参见附录2.5），我们先将池里10%的代币分配给活跃用户，接着我们调小STUT的数量，把代币分配给关联度相对小的学生（流程如附录1.1所述）。
- 附录从经济计量学的角度详细分析了这整个管理模式。

4.3.2. 课程的相关信息

- 课程的价格和时长是决定与之相关联的STUT代币数额的关键因素。价格越高且时长越长，课程的代币数额就会越大。
- 免费课程的关联度（STUT代币）最大等于等价付费课程的1/10（计算时需根据同类型的付费课程时长和价格进行调整）。例如，假设“数据库”技能里的付费课程平均价格为90欧元（9000 STUT），平均时长为 3 小时，则同技能且同时长的免费课程最大STUT 数额即 (9,000/3)/10 = 300 STUT。如果是同技能的课程但时长只有1小时，则其代币数额最大为 ((9,000/3)/3)/10 = 100 STUT。
- 不管是付费课程还是免费课程，只有关联度最高的学生才能获得最大的STUT 代币数额，其余学生获得的代币数额都会相对小一点。具体的分配流程请参见附录。
- 在一个分权模式里，行动的有效性是通过评量准则来确立的。例如，当一名学生回答了一个问题时，需要有规定数量的其他同学认可该回答才能使回答生效。
- 关联度足够高的用户就有权进行高价值的决策，例如：
    - 课程审批
    - 职业设计
    - 导师辅导
    - 新类别建议

4.3.3. 关于交易决定

- 课程结束时，学生可以决定每个课程用多少STUT币换成TUT币。决定将存储在区块链中，无法更改。
- 课程期间的行为所赚的STUT币会先存入钱包，直到交易决定时才真正归学生所有。由于交易的执行涉及成本，所以学生只能作一次决定。
- 通过给每个课程执行代币交易，学生可以选择保留哪些课程/代币以衡量整体关联度，以及哪些用于兑换成现金，从而在交易其他技能时维持某些技能的关联度。

4.4. 完整流程

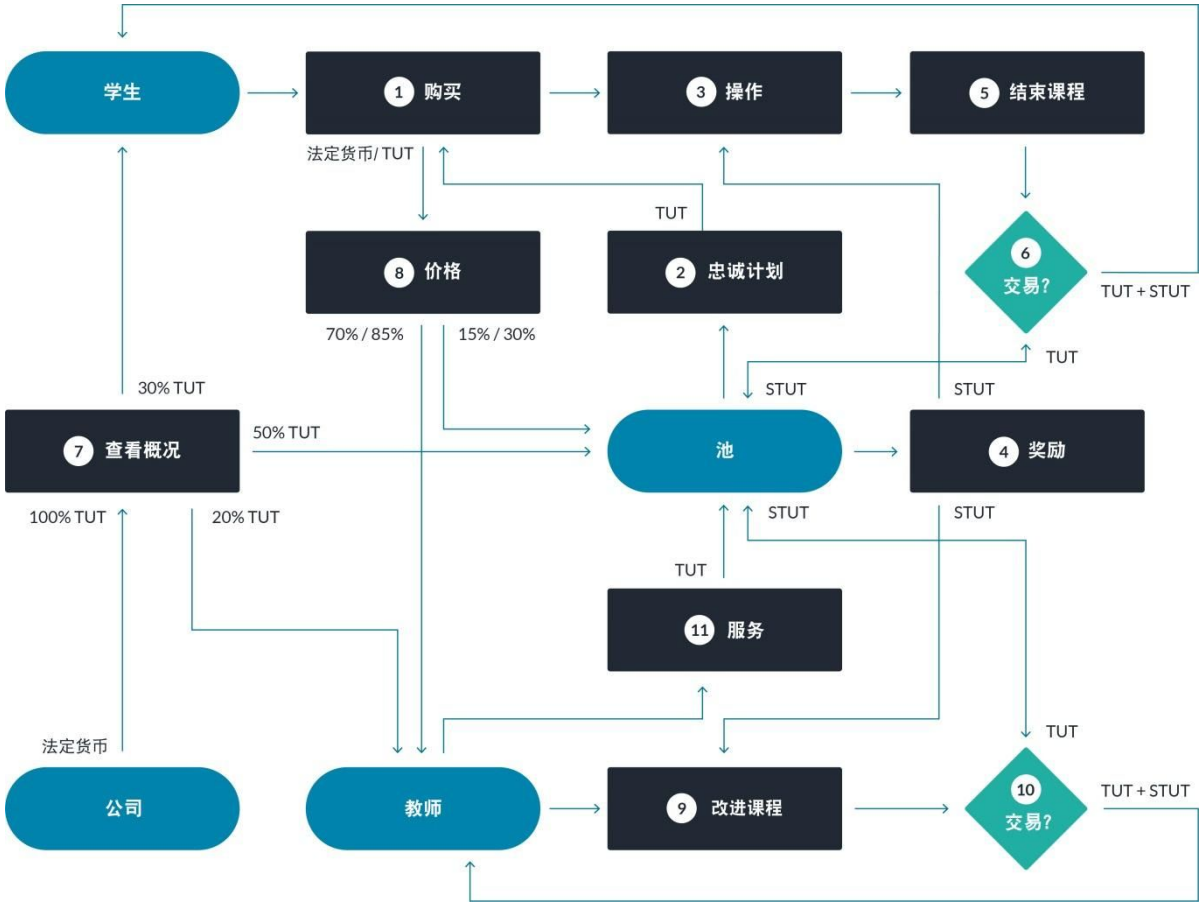
下面我们通过一个示例来说明平台的完整流程：

- 一名学生用30欧元购买了一个课程(1)。该学生可以用助学金免费获得该课程。如用TUT代币支付，该学生可以享受10%的折扣。
- 利用忠诚计划，该学生可以按照课程价格的5%至10%享受TUT代币返还（2）。钱包用于存储TUT代币和课程结束时及STUT兑TUT交易决定后产生的STUT代币(6)。
- 学生开始课程后，通过增值行为（3）从Tutellus的代币池获得若干STUT代币（4），最多是课程价格（以欧元为单位）的一百倍，这里以3000 STUT代币为例。代币数量显示学生在本平台内的关联度。

- 课程完成后（5）决定交易（6）：学生可以保留STUT代币作为关联度，或者将50%的STUT代币兑换成TUT代币，STUT代币兑欧元的固定交易率为100:1，兑换的TUT代币价值15欧元。此时，这些信息都会被存储在区块链中，学生将3000 STUT代币中的50%兑换成价值15欧元的TUT代币，剩余的1500 STUT代币用于显示关联度。如果未进行交易，学生将保留3000 STUT代币用以显示关联度，这会增加以后赚更多收入的机会。
- 与此同时，一家企业正在寻找具备某些技能的优秀学生弥补职位空缺（7）。该企业以一定的汇率从Tutellus购买TUT代币，以查看具备某些技能的优秀用户的简历。如果购买课程的用户是关联度最高（以STUT代币衡量）的学生之一，该用户将被选为候选人，并获得公司支付的费用中的一部分。
- 公司费用分配如下：本平台收50%，候选人得30%，教授学生技能的课程教师得20%。
- 教师也可以从课程收入(8)中赚取部分费用（货币或TUT代币）。此外，跟学生一样（10），如果教师的行为增加了平台的价值（9），教师也能得到STUT代币（4）奖励，这些代币可用于显示关联度或兑换成TUT代币。
- 如果企业发现合适的学生，教师也能获得部分收益，从而激发积极性。
- 最后，教师可以用TUT代币(11)在本平台内购买产品或服务（促销、活动等）。

在这个生态系统内，所有人都能有所得。

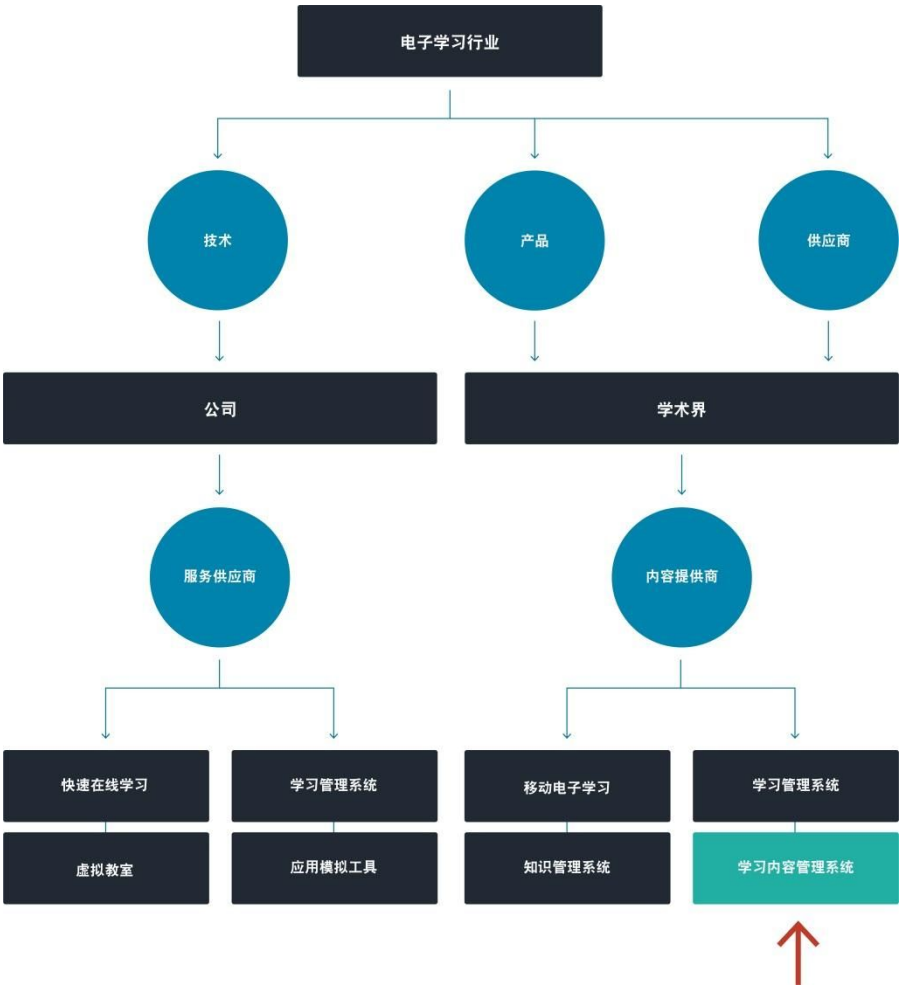
STUT代币只能在本平台内交易，只能兑换成TUT代币，且受前文所述限制条件的制约。



平台内TUT和STUT代币流

5. 市场

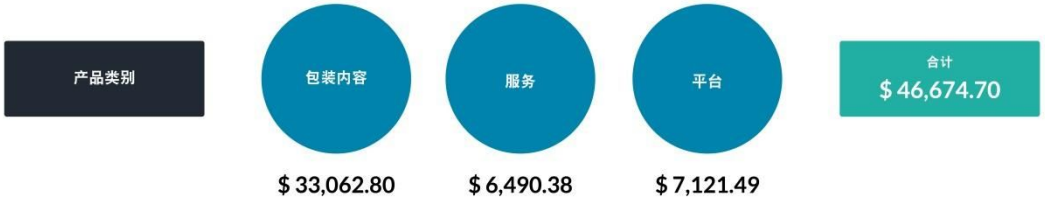
福布斯调查显示，2016年在线教育市场价值1650亿美元，主要分布在英语国家（美国、英国和印度）。预计该市场将继续保持增长，2023年市值突破2400亿美元（来源：Docebo)



来源：Ambient Insight 研究报告

2016年Tutellus目标次市场价值330亿美元，其中90%的市场集中在北美、亚洲和欧洲。拉美地区虽仅占次市场的4%，但发展潜力巨大。

2016年全球自步电子学习收入（按三大产品类别划分）（单位：百万美元）



“学习内容管理系统”业务分部来源：Ambient Insight 研究报告

5.1. 教育科技公司

需要区分多个次市场：

- MOOC（大型开放式网络课程）平台Coursera、Edx课程内容由大学创建并在特定时间内公开。不涉及就业市场。
- 订阅模式Lynda、Pluralsight等。专注于垂直市场和B2B。
- 市场Udemy、Skillshare等不涉及大学，专注于价值较低的产品（课程）。不涉及就业市场。
- 专业平台Udacity，龙头企业为专业人员提供短期（约4至6个月）视频课程培训。与就业市场有一定关系。
- 区块链上的新项目：我们发现三家初创公司，目前已经启动，但它们在该市场还没有产品、没有学生资源库，在该行业没有业绩记录，也没有立即开课的能力。这三家公司为：beOne、DLS Academy和BitDegree。只有BitDegree似乎有较完善的模式。

下表列出了所有相关的竞争者，指出了各自的优缺点：

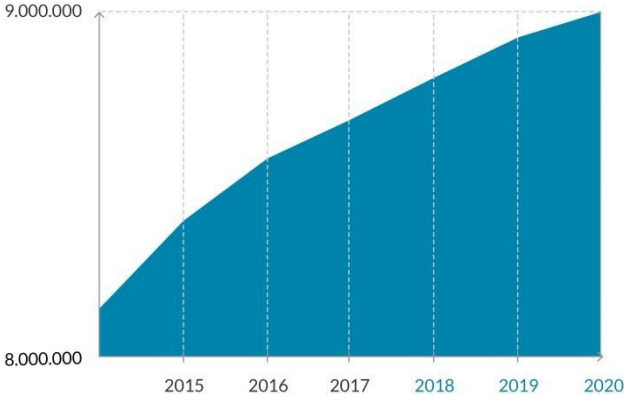
	Tutellus	Udemy	Coursera	Edx	BitDegree	Lynda
免费还是付费课程?	两者	付费	两者	两者	免费	付费
学生是否赚取收入?	是	否	否	否	是	否
免费认证?	是	否	否	否	是	否
通过第三方实体估值?	是	否	否	否	是	否
合作型平台?	是	是	否	否	否	否
经测试技术?	是	是	是	是	否	是
已经可用的课程?	是	是	是	是	否	是
在教育科技的往绩记录?	是	是	是	是	否	是
区块链整合?	是	否	否	否	是	否
价值*	**10**	**5**	**5**	**5**	**4**	**4**

教育科技平台评分（0、1、2）取决于量化服务所得价值

大型的教育科技平台内部有成百上千名员工，很难将所有的服务和技术转移到区块链。目前只有Tutellus集成了区块链技术，在教育技术领域有业绩记录，和一个经证实能给所有参与人带来利益的业务模式。

5.2. 教育与就业的关系

对高级专业人才的需求，尤其是IT人才，预计接下来的几年在欧洲乃至世界各地将经历迅猛增长。多项研究表明，在不久的将来，市场对拥有专业学术背景的人才仍有很大的需求。



预期欧洲未来几年对IT人才的需求。

同时，市场已发现明确的专业技能培训机遇。加入Tutellus，我们能帮助培养专业技能，并向有需要的第三方实体提供服务。

工作概况	2016	2017	2018	2019	2020	2021
前端开发工程师	20	-4	-7	-9	-26	-82
UX/IU设计师	30	-15	-62	-62	-71	-74
数字产品经理	4	-1	-2	-12	-73	-63
后端开发工程师	15	-5	-27	-9	-45	-52
解决方案架构师	5	0	-1	-1	-1	-2

未来几年市场对技术岗位的需求。来源：BCG

人才市场紧张，众多企业在接下来的几年都会积极招聘人才，弥补职位空缺。

5.3. 寻找优秀人才过程中的问题

目前，就业平台、猎头、临时就业介绍所都还难以提供一个品质产品来帮助公司发现并筛选所需要的人才。他们仍在用上个世纪的一些模式，如今这些模式都已不再适用了。

他们也尝试过一些不同规模、不同领域的平台，但结果却不太理想：

- 人才无法满足公司的需求。
- 培训没有达到预期的效果。
- 佣金高（一般为第一年薪资的20%）。

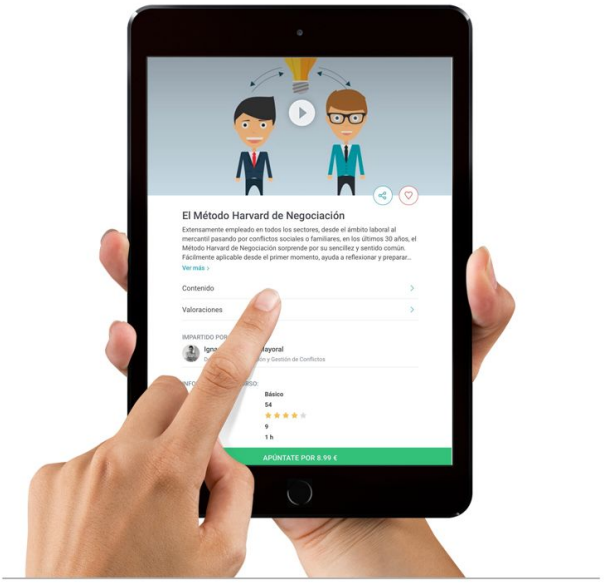
我们的分散模型能让我们更好地对潜在候选人分门别类。我们可以利用超前的技能筛选技术为公司提供最优简历。

例如，搜索懂Javascript技术的人才时，我们能知道Javascript技术和NodeJS技术的关联度、Javascript技术和JQuery等技术的关联度，以及与其他诸目标微技能之间的关联度。

6. 关于本公司

6.1. 简况及动力

Tutellus是西班牙语国家最大的在线教育协作平台。2013年成立，如今拥有来自160个国家的一百万用户，有130,000多个视频课程，已成为该市场领先的平台。



VISIT TUTELLUS

我们与80余所大学和商学院签有合约，提供独特的优质教学资源，并与四家合资机构联合设立专门的大学学位。

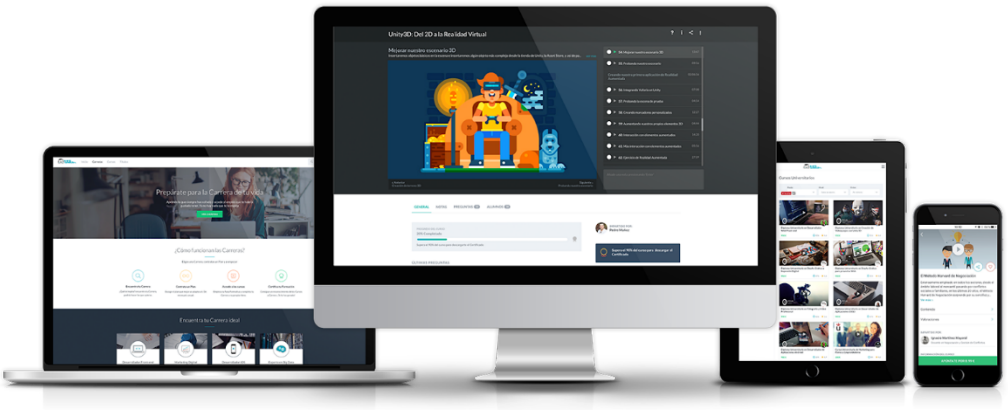
我们的基础产品是视频课程：我们的教育套餐包括视频和提高学习体验的额外服务。通过这些核心元素，我们提供可以增值、价格更高的服务，如订阅服务或大学文凭。

1,000,000 名学生	2,000,000+ 宗交易	1b+ 分钟学习	$10M 交易
120,000+ 个视频课程	3,000 名教师	80+ 个教育机构	160 个中心

经过过去四年的稳健发展，我们平台内的交易量逾两百万次，价值一千万美元，在线教育时常超过十亿分钟。我们通过详尽的用户行为分析去深入了解用户的需求和每个人的最佳培训时机。

我们的目标是充分利用自身独特的优点成为世界性的在线分散教育平台：***Tutellus是唯一出资供用户学习的平台。*** 围绕新概念产生的动力将在世界范围内推动新供需的产生。

公司已投资150万美元用于平台开发、目标市场确定和价值主张。



6.2. 团队

以下为公司核心团队成员的简介，这些成员均定居西班牙马德里。

Miguel Caballero,首席执行官、联合创始人

20年业务管理经验；工业工程师，西班牙商学院工商管理硕士（1999），连续创业者；2000年创立Quoba（后卖给IBM），2002年创立Neomedia（2010年关闭）和MET（Neomedia的副产品，后卖给Vectalia）；2012年起完全投身于Tutellus。

Javier Ortiz,首席技术官、联合创始人及核心开发员

25年编程经验；Java讲师、开源项目贡献者、企业家；Sokartec创始人，2002至2011年期间曾参与苹果公司和西班牙电信公司的多个研发项目；2007年在大学遇到Miguel后（两人均来自阿里坎特），两人开始共同开发专业产品；2012年与Miguel共同创立Tutellus。

Carlos López, 后端及区块链开发员

15年编程经验；计算机工程师；2014年开始开发Tutellus的基础结构和服务；Docker、微服务和NodeJS专家；2010年起开始钻研区块链和比特币，目前从事以太坊研究。

Javier Calvo, 工程师、数学家、代币经济师

25年从业经验；数学学位，计算机工程师；公司内部深度学习项目经理；平台代币机制数学专才；长期代币经济流算法设计师。

Karolina Szymańczak, *UX*、设计师

10年从业经验；平面设计师，曾参与BQ等项目的app设计。2014年起负责整个界面的设计和平台上的服务。

Jaime Zapata, *Operations*

Jaime manages the relationship between users, teachers and students within the platform. He works looking for new content and reinforcing the community. He studied Publicity & PPRR and is a blockchain fan since 2016

Nacho Hontoria, *Marketing Manager*

10 years of experience in Marketing and SSMM industry. Coordinator of different portals in ATRESMEDIA and founder of Cantera Digital. Nacho is familiar with both Blockchain and Sports topics, producing a unique combination of both industries

Alex Ginés, *PR & Community*

10 years in IT industry, the last 4 years in Blockchain. Previously in Atraura as CMO, Alex is the founder of Jarvis.io and has worked also in VR industry, with experience in Public Relations and Communication

Covadonga Fernández, *Relación con Medios*

30 years of experience as journalist. Founder of Blockchain Media, Observatorio Blockchain and Comunica Blockchain. Associate to PUBLIQ and Criptonoticias. Cova is one of the most influential crypto journalists in latin countries

6.3. 顾问

Eddy Travia

伦敦上市公司Coinsilium集团(NEX:COIN)首席执行官、联合创始人；创投建设师、投资人、区块链创业促进师；2013年成为区块链和比特币创业公司先驱投资者；2014年区块链奖上获年度三大最具影响力投资人提名

Miguel Solana

2011年成为区块链及VC顾问、桑坦德中国新方案前负责人；曾任职于世界银行。斯坦福大学及伦敦经济学院研究生

Oleg Postokin

Entrepreneur, startup founder, go-to-market strategist. CEO of Cryptonomos, the most important platform for secure token sales. Also founder of Viar.live, a platform that makes easy to create and share VR content, and Enkrypt, a revolution in the way attorneys communicate with clients. Xsolla VP.

Yacine Terai

Nearly 15+ years global experience in Business Growth, Marketing Strategy and managing global startup ventures. Specialized in Token crowdsales for innovative startups. Former VC @Coinsilium Group, recently founded StartupToken, a Blockchain Hyper Accelerator.

Rene Lauk

CEO Oblicity and legal counsellor for Estonian Government, working on the Legal framework for distributing European Union structural funds. Tallinn University Degree with honors

Daniel Díez

区块链UST Global全球总监；ESIC教授、《区块链》联名作者；2011年起从事区块链工作； Furai.co、Blockchain Toolkit、Bit2Me & YUROHS联合创始人； 生态系统推介人之一

6.4. 合作关系

Tutellus与教育及区块链机构有密切合作，这些机构包括：

NEM Foundation
The NEM Blockchain is one of the top Blockchain in the crypto world, with an excellent match with the Tutellus platform through its layered infrastructure and APIs.

Coinsilium
区块链生态系统推介人之一。RSK、Coindorse及Coindash的投资人；Coinsilium是一家在亚洲有着较大影响力的伦敦上市公司。

Cryptonomos
The most relevant platform for ICO retail, Cryptonomos has managed some of the most exciting ICOs in the world, raising more than 200 million USD for them.

Avolta Partners
One of the main european firms in VC, M&A and crypto fund. Based in Paris, the company has raised with + 200 million € for their startups.

StartupToken
A global company focused on promoting and boosting a few startups through Asian markets, giving them visibility in local ecosystems.

Oblicity
Oblicity is a leading corporate and internet law firm in Estonia, which offers the most advanced token sale framework in the European Union. Oblicity has been involved in +10 ICOs, raising USD10 - USD 75 million in each one.

Donnelley
Donnelley Language Solutions is a Donnelley company (a centenary company with +1bn Revenue), based in NYC and with the goal to provide global solutions worldwide.

Indorse
A professional network with emphasis on skills validation, and works with Tutellus improving the students experience through real accreditations.

与拉美和西班牙大学达成合约

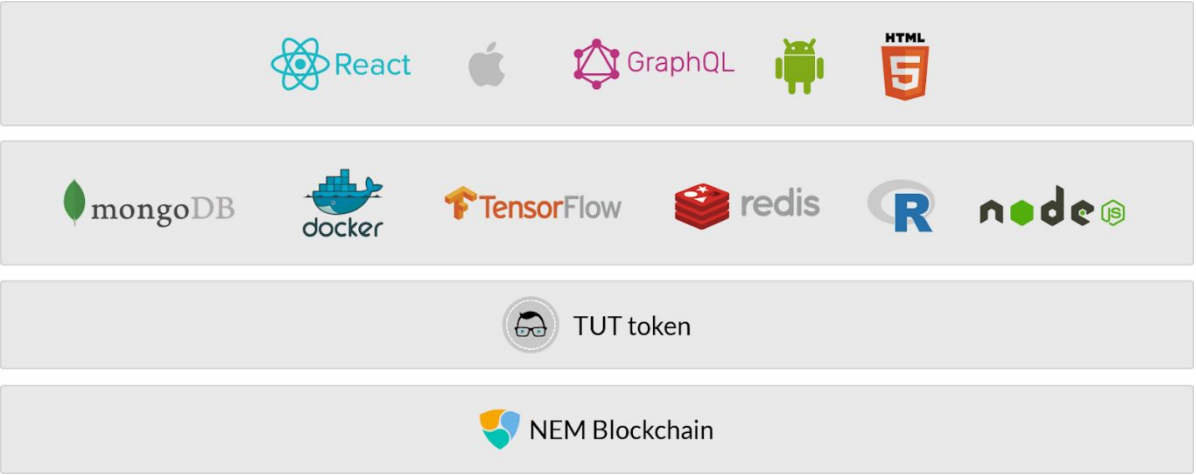
与西班牙语地区重点大学和商学院达成70多份合约，帮助推销各科目和各级别教学内容。

这些合约为本平台带来50,000多个视频课程，任何感兴趣的人都可以免费学习。

7. 技术

Tutellus将采用如下四层结构：

- **多平台应用**：提供APP（Android、iOS、网页APP等）服务和分散服务。均为充分开发完毕和已处于生产过程中的。
- **微服务API**：为服务提供方法和功能的开源API。部分在生产（关联方API）
- **代币**：基于NEM区块链的全流通代币：TUT。
- **区块链**：存储用户关联度和已部署的智能合约的数据库



7.1. 多平台应用层

本层拥有以下特点：

- ReactJS作为前端，迁移到React Native
- 基于GraphQL的自定义React界面，实现商业智能和计量经济。
- AI Chatbots，用于支持服务与潜客信息发掘
- APP服务（Android、iOS、网页APP等）

7.2. 微服务 + API层(Tutellus.ai API)

Tutellus已在开发公共API用于关联管理。 本界面汇集有关整合本平台和第三方网站及应用服务的方法和功能。

- 本界面设计成以主要语言运行：NodeJS、JavaScript、Python、PHP和Ruby
- Docker.io用于微服务
- NodeJS作为核心
- MongoDB作为NoSQL数据库
- R和Python用于大数据分析
- TensorFlow用于深度学习
- Redis和环境，用于API周围的其他项目

7.3. 代币层（TUT）

TUT代币遵循NEM标准，与本生态系统完全融合，能够存储在XEM钱包内。

7.4. 区块链层

在区块链层，Tutellus将存储所有参与者之间的交易结果，并按照技能和微技能存储用户关联度。

选择用NEM作为合作伙伴来调度APP的市场原因如下：

- 速度。NEM每秒约能运行1,000次交易，远超Ethereum（每秒7次）。新版NEW预计每秒可运行4,000次交易。
- 自定义。NEM可以调度内部区块链，免费交易，因此我们将用它来记录代币的动态。
- 以API为中心的连通性和JS程序库符合Tutellus上的技术栈。
- 开发过程中有来自NEM基金会的支持。

8. 发展历程

Tutellus从2013年起开始不间断运营，如今将迎来巨大突破：将大部分基础设施、应用和服务从当前栈（针对MongoDB数据库围绕API建立的微服务）转移到区块链。这个过程将对用户公开，且所有服务保持不变。

至今为止，公司平台的发展历程如下：

- **2013年4月** 平台启动，有2000个视频课程
- **2014年1月** 10,000个视频课程和100,000用户
- **2014年12月** 与大学合作，设立专门的学位
- **2015年5月** 推出新平台：基于API的微服务
- **2015年10月** 50,000多个视频课程和400,000用户
- **2015年11月** 推出Tuitermachine等自主开发的产品
- **2016年5月** 推出关联方公共API
- **2016年9月** APP在Apple及Google商店发布
- **2017年2月** 与MIT达成深度学习项目合作
- **2017年9月** 视频课程突破130,000，用户数量突破900,000。转移到区块链。

未来几个月将投入三组服务：

- 用户服务；
- 公司及第三方服务；
- 其它服务（通过API）

8.1. 用户服务

- 钱包互操作性及管理
- 用TUT及STUT加密币执行内部运营
- 全线产品（课程、订阅服务等）代币化

本模式将在用户获得关联度（STUT）后即刻启动。为此，平台需对平台上的特定行为奖励代币。所以，我们首先需要将授予学生STUT代币的活动（详见3.3章节）进行代币化，这些活动均与学生的学习过程相关。

这些活动预计在2018年第一季度完成。

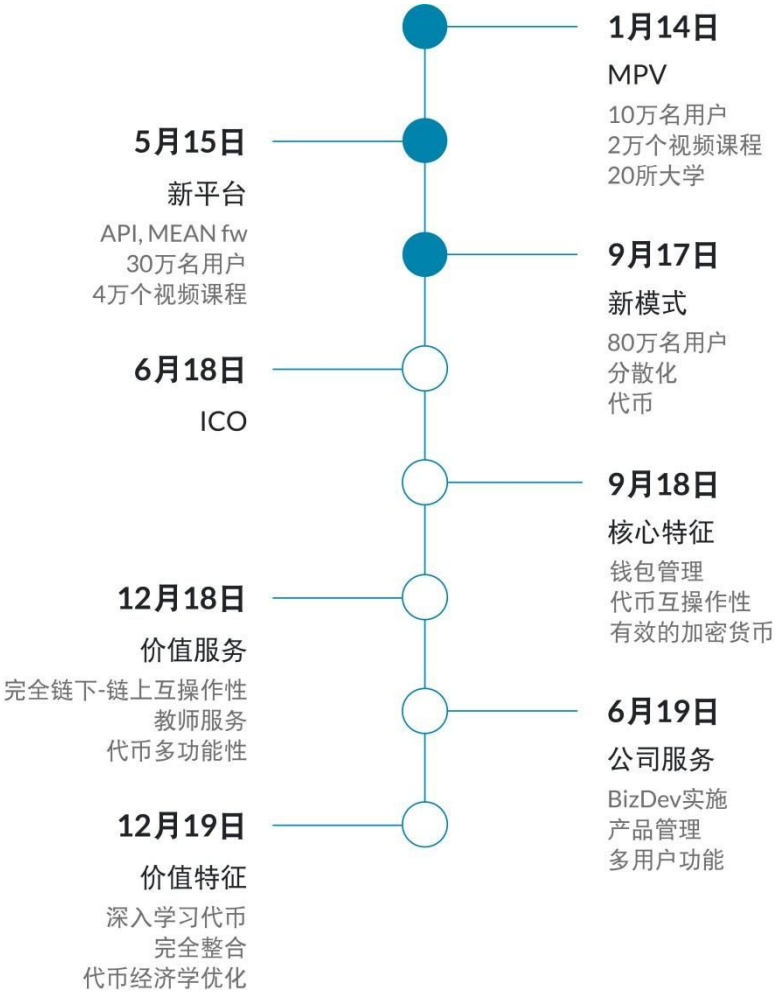
8.2. 公司及第三方服务

- 基于关联度的访问管理参数设置
- 目标实体设计（员工、组织机构、公司、教师）
- 相关产品的创建（前导数据、大数据、促销、广告、宣传、营销等）
- 履行所有相关方之间的智能合约

8.3. 其它服务（通过API）

- 通过微服务发布API
- 代币多功能性
- 应用深度学习技术的代币经济优化

按时间顺序查看本过程：



9.参考资料

- Tutellus再造MOOC（SP博客，2013年4月）：http://2tel.us/2kbrFkT
- Tutellus获得价值一百万美元的种子投资（Novobrief，2014年11月）：http://2tel.us/2wrcFRw
- 与Prisa媒体集团达成合作（El Pais，2015年1月）：http://2tel.us/2kb1NWl
- 领先的教育科技平台（La Razon，2014年5月）：http://2tel.us/2wqnK5A
- 西班牙最大的市场（Prisa，2015年5月）：http://2tel.us/2kb3enH
- ReferentesTV与首席执行官的访谈（El Referente，2017年5月）：http://2tel.us/2wqnSSy

APPENDICES

Appendix I: the STUT tokens

The STUT token measures the educational value the user contributes to the Tutellus community, and is associated with a set of skills, both general (e.g., programming, history, etc.) and specific (solidity, php7, etc.). There are multiples ways for a user to earn STUT, but all of them are related with learning and with helping other users to learn. STUT tokens are not always tradable: they cannot be bought, and can be sold only under special conditions.

Initially there will be a STUT pool ten times bigger in size than the TUT pool (1,000,000,000). 10% of the initial pool will be distributed among the members of the community, students and teachers, according to the educational value provided by them at the moment. This gives us an initial quantification of the relevance of each member of the platform.

After that, students and teachers may earn STUT tokens from the pool by interacting with the platform. From time to time the state of the pool will be checked, and if the percentage of the tokens in the pool against the total number of tokens goes below a certain percentage, the pool will be increased in one of two ways:

a) Issue of New STUT Tokens.

This option implies a moderately inflationary model for the STUT tokens, with different goals:

- To make it easy for Tutellus to implement changes in the model in order to stabilize it;
- To slowly adjust the value of the payments in STUT already done without changing the nominal value and thus prioritizing the relevance recently obtained. A course finished two years ago will still provide the same number of STUT tokens, but the actual value of the amount will be less since there are more tokens in the system;

b) Withdrawal of a Percentage of STUT Tokens from students that have been inactive in the system for a long period of time who do not contribute educational value for themselves or for other users.

The goals behind this are:

- To assume the eventual obsolescence of the skills learned. After a while, the value of what is learned but not used becomes zero.
- To motivate the creation of more value in the community, either by learning or by helping others to learn.

The percentage of STUT tokens taken from the user will depend on the skill associated to the STUT tokens. Tutellus has a wide range of courses, from history to recent technology, and the rate at which how fast a course becomes obsolete greatly varies between subjects.

If the student takes the decision of trading the STUT, the value in TUT tokens of the traded STUT tokens is directly related with the price of the course, up to 100% of the price, depending on the relevance of the student and the commitment shown in the learning process.

With free courses, the value of the STUT token when traded is related to the duration of the course. It is possible to earn STUT tokens exclusively through free courses, without relying on

grants, paid products, or other sources, but the amounts of STUT tokens obtained will be low. Quality education has a cost, and the educational value of a paid course should be bigger than that of a free course of similar content. This difference will thus be reflected in the platform's reward system.

STUT that are not associated with any course cannot be traded; they act as a measure of the knowledge and relevance of the user in their skills.

The teachers earn STUT tokens by doing activities in their own courses, ensuring the quality of the courses, and by contributing value to the community, according to a model similar to the students' model. By doing this we get a quantification of how valuable each teacher is for the platform. Often, teachers may also be students themselves; in such cases, the two reward systems will be treated separately.

Appendix II: Tokenomics in Detail

In this section we will provide a deeper look at some aspects of the model, detailing the economical and mathematical foundations behind it.

II.1. Token Sharing Model Based on Relevance

On multiple occasions through the TUT token flow, a certain amount of them is shared among a number of users according to the educational value contributed to the community. These shares are done using a simplified Zipf distribution.

Zipf's law is an empirical law, closely related to Pareto's principle, found in many aspects of real life, usually associated with popularity ranking, frequency of use, or relative relevance inside a set of elements. An ordered array of *K* elements

$$[v_1, v_2, v_3, ...v_k]$$

follows Zipf's law if the value of the element found in the *k* position, v_k is close to v_1/k , the value of the first element divided by the position of the element inside the array, for all values of *k*.

As an example, natural languages follow the law of Zipf. If we order the words that form the vocabulary of a language by how often they are used, the aforementioned property is found. For the English language the most often used word, ('the') is used close to 7% of the time in any text or collection or texts big enough for analysis. The second most often used word, 'of', is used about half as often, 3.5% of the time. The third most often used word, 'and', is used about 1.75% of the time, and so on. The same behaviour can be found in many other situations, such as population distributions, web page traffic, activated neurons in our brains after stimulation, or the number of people following a certain news channel. If there are enough elements in a set, it seems the Zipf's law structures their popularity or relevance in countless situations.

The decision to use this law to do the shares comes from three considerations:

- It properly values the effort made by the users, since it is based on a model that is often found in real life. Thus it can be considered a fair system.
- It rewards in greater quantities those users that provide high value to the community. This way the best users will get significant payments that cannot be easily discarded as irrelevant.
- It rewards all value provided, even those from the smallest contributions. This way all users actively providing value to the platform will be rewarded, with a clear cause-and-effect relationship between effort and reward.

All three considerations have a common goal: to motivate the user to participate. To work, the model should be completely transparent, with all users being informed of their relevance in the platform, the value associated with this relevance, and how much of a share this results in.

Let's call *A* the number of active users in Tutellus in a given skill at the moment of a share. To distribute a quantity, we need all users ordered in a decreasing order by relevance, measured in STUT tokens, both globally and for any given skill.

When distributing *B* in this set of users, every element found in position *k* is given *1/k* times the value of the first element. So the values to share are

$$[q, q/2, q/3, ...q/A]$$

Where the sum of the values is B

$$\sum_{k=1}^{A} \frac{q}{k} = B$$

$$q. \sum_{k=1}^{A} \frac{1}{k} = B$$

$$qS = B$$

This *S* is a harmonic series in which partial sums follow a logarithmic growth, a property that produces the features we are looking for. Its value for a finite number *A* is

$$S = LnA \ + \gamma + \varepsilon(A)$$

Where the second term is the Euler-Mascheroni constant (close to 0.5772), and the third is close to *1/2A* for high values of *A*. Given the values found for active users in Tutellus we can visualize the sum as

$$S = LnA + 0.5772 + 1/2A$$

And the shares thus being

$$[B/S, B/2S, B/3S, ...B/AS]$$

Some examples of distributing 1000 TUT between students with a given skill are provided here:

Students	S	Best student	Student 10	Student 100	Student 1000
1000	7,48	133	13,3	1,33	0,13
10000	9,78	1022	102,2	10,22	1,02
100000	12,09	8271	827,1	82,71	8,27

As expected, *benefits are quite significant for the best students, and very low for the last ones.*

It is important to keep in mind that these payments are in TUT, and so the real value in EUR or ETH of these rewards depends on the market value of the TUT token at the moment. Since the TUT token follows a deflationary model, an increase in the transactional market associated with a growth in the value of the platform will create a bigger value—measured in EUR or any coin other than TUT—of these rewards, following the growing and the increased worth of the entire community. It is because of this that the community of users itself is the body that determines

the ultimate value of the rewards, ensuring through their efforts that those are economically significant.

In this way, *a large increase in the value of the Tutellus community generates—through a totally transparent process—an equally large increase in the rewards the community can give back to its users.*

Other criteria, such as nationality, may be involved in the distribution of the tokens in order to help those coming from developing countries.

II.2. Gain Model for Students

One of the innovations offered by Tutellus is the distinct possibility for the students to get significant economic benefits, from both learning and helping other people to learn. The platform rewards the students that provide educational value to the community through the STUT and TUT tokens. The TUT token is a source of income, and the STUT token quantifies the effort of the student, with indirect benefits associated.

Let's take S_0 as the total number of STUT for a student at the beginning of a period. These STUT are associated with specific skills, in which the student knowledge and contributions are quantified by an array of *H* skills with associated values

$$H_0 = [s_{10}, s_{20}, s_{30}..., s_{H0}]$$

Which we consider follows a decreasing order. The sum of all values is greater than or equal to S_0 , since a single STUT may be associated with multiple skills, depending on the skills associated with the course it comes from.

This number of STUT determines the student position within the ordered array of students, with ω_0 the position of the student at the beginning of the period, and ω_{h0} the position of the student in the STUT array associated with the skill *h*. The *H* array is thus associated with a *P* array giving the relative position of the student in all the skills acknowledged:

$$P_0 = [\omega_{10}, \omega_{20}, \omega_{30}..., \omega_{H0}]$$

This example assumes that the student has not suffered STUT wallet penalizations as a result of significant period of inactivity. While a highly relevant student may still have significant earnings even after long periods of inactivity, this is not a common case. In addition, this modification to the model is quite trivial; it merely subtracts all elements s_{i0} from the student's STUT array according to the quantity taken.

There are four different sources from which a student can earn tokens:

1. Through paid products, usually courses.
2. Through free products.
3. By getting a share in income from companies and other third-parties
4. By getting a share in study grants.

The sum of these four sources—which can be TUT, STUT, or both—represents the total income.

II.2.1. Paid Products

Let's say a student finished *N* paid courses during a certain period, each one with a price p_i. Each course is associated with a set of skills, with the student who finishes the courses generating STUT associated with those same skills. Once finished, a course gives the student tokens in different ways:

1- STUT Tokens

At the end of the course the student gets a certain number of STUT tokens associated with the skills tagged in the course depending on the price of the course p_i and the level of additional participation and effort shown by the student α_i. This amount is quantified up to the equivalent of the total price paid for the course. Up to half of these STUT tokens can be traded for TUT tokens, so the final amount of STUT tokens, for a β_i percentage of STUT tokens traded to TUT, is:

$$I(STUT) = \sum_{i=1}^{N} p_i \alpha_i.(1-\beta_i) ; \alpha_i \in [0,1],\ \beta_i \in [0,0.5]$$

2- TUT Tokens

The loyalty program provides the student with a number of TUT tokens, between 0.05 and 0.1 times the price of the course, to use for future purchases:

$$p_i * 0.05 * (1+\mu),\ \mu \in [0,1]$$

The value for μ depends on the global relevance of the student, quantified through the total amount of STUT tokens. Following the Zipf's distribution to reward this relevance, the share will depend on the position held by the student in the STUT array ω_0

$$\mu = \frac{1}{\omega_0}$$

Which gives us the total number of TUT tokens provided by the loyalty program:

$$I(TUT)_1 = \sum_{i=1}^{N} p_i * 0.05 * (1+\frac{1}{\omega_0})$$

We must add here the total amount of TUT tokens coming from the trade of STUT tokens at the end of the course, as explained in the previous section:

$$I(TUT)_2 = \sum_{i=1}^{N} p_i \alpha_i.\beta_i ; \alpha_i \in [0,1],\ \beta_i \in [0,0.5]$$

Adding the price paid for the courses, the total balance for the student is

$$I(TUT) = I(TUT)_1 + I(TUT)_2 - \sum_{i=1}^{N} p_i$$

Which means that the completion of *N* paid courses, each with a price p_i, where the user is holding the ω_0 position in the STUT array of global relevance, has received a number of STUT tokens accounting for α_i of the price, and has traded a proportion β_i of them to TUT gives us the following total amount of TUT gained:

$$I(TUT) = \sum_{i=1}^{N} p_i.[0.05 * (1 + \frac{1}{\omega_0}) + \alpha_i.\beta_i - 1] \; ; \alpha_i \in [0,1], \; \beta_i \in [0, 0.5]$$

II.2.2. Free Products

The number of STUT tokens the student receives after finishing a free course depends on the duration of the course d_i through a function $f(d_i)$. This function is defined as a step function to avoid excessive values. The STUT obtained thus follow the same treatment as the STUT coming from the paid courses, with the user being able to trade up to 50% of them for TUT tokens.

So, if during a period the student finishes *M* free courses with a duration d_i each, after trading β_i of the STUT tokens, the student finally gets:

$$II(STUT) = \sum_{i=1}^{M} f(d_i).(1 - \beta_i) \; ; \; \beta_i \in [0, 0.5]$$

$$II(TUT) = \sum_{i=1}^{M} f(d_i).\beta_i \; ; \; \beta_i \in [0, 0.5]$$

II.2.3. Income from Companies and Other Third-Parties

During the period being considered, a certain number *E* of companies and other third-parties provide a number of TUT tokens associated with specific skills in which they are most interested, searching for a number of users adept at those skills. Being one of these potential candidates generates income for a student.

Let *H* represent the set of skills of a student with an ordered STUT array $[s_{10}, s_{20}, s_{30} \ldots, s_{H0}]$, which gives us an array of positions within the total of students for this skill, $[\omega_{10}, \omega_{20}, \omega_{30} \ldots, \omega_{H0}]$.

For each of these skills *h*, the third-party entities have contributed a number of TUT tokens $[T_{1h}, T_{2h}, T_{3h} \ldots, T_{Nh}]$ in order to find the best n_i students in the skill. Being among the candidates gives the student a share of 30% of the income provided by the entity, which is equally distributed between the number of selected students.

$$\sum_{i=1}^{E} \sum_{h=1}^{H} \frac{0.3 * T_{ih}}{n_i}$$

Where T_{ih} is the income given by the entity *i* for the skill *h*, searching for n_i candidates.

To get access to this income, the position of the user in the STUT array for every skill, ω_h, must be one of the n_i highest positions in the array, which gives us:

$$III(TUT) = \sum_{i=1}^{E} \sum_{h \in H, \omega_{h0} \leq n_i} \frac{0.3 * T_{ih}}{n_i}$$

It is important to keep in mind that the goal of these searches is to connect companies searching for specific profiles of skills with students who excel in those skills, so these benefits for the students inside the platform are just the beginning, with the opportunity to be hired by one of these companies being the ultimate goal.

II.2.4. Shares in Study Grants

Monetizing the platform lets the most active and valuable members take a larger share in the benefits to the whole community. This is implemented through a study grant system associated with skills of high interest.

In a certain period, a student receives benefits from study grants awarded for some of the *H* skills associated with the student. For these *h* skills, the funds are $[B_1, B_2, B_3, ...B_H]$ TUT, which are shared according to the application of Zipf's law detailed in a previous section

$$\frac{B_h}{\omega_{h0} * [LnA_h + 0.5772 + 1/2A_h]}$$

Where A_h is the number of active students during the period with the skill *h*, which ultimately gives us:

$$IV(TUT) = \sum_{h=1}^{H} \frac{B_h}{\omega_{h0} * [LnA_h + 0.5772 + 1/2A_h]}$$

Other criteria, such as nationality may be involved in the distribution of the grants in order to help people from developing countries.

II.2.5. Conclusion

As a result of the different sources of incomes, the final benefits for the student are:

Income (TUT):

$$G(TUT) = I(TUT) + II(TUT) + III(TUT) + IV(TUT)$$

$$G(TUT) = \sum_{i=1}^{N} p_i.[0.05 * (1 + \frac{1}{\omega_0}) + \alpha_i.\beta_i - 1] + \sum_{i=1}^{M} f(d_i).\beta_i + \\ + \sum_{i=1}^{E} \sum_{h \in H, \omega_{h0} \leq n_i} \frac{0.3 * T_{ih}}{n_i} + \sum_{h=1}^{H} \frac{B_h}{\omega_{h0} * [LnA_h + 0.5772 + 1/2A_h]}$$

Relevance (STUT):

$$G(STUT) = I(STUT) + II(STUT) + III(STUT) + IV(STUT)$$

$$G(STUT) = \sum_{i=1}^{N} p_i \alpha_i .(1 - \beta_i) + \sum_{i=1}^{M} f(d_i).(1 - \beta_i)$$

Where:

- *N* is the number of paid courses finished, each with a price p_i, with a participating coeficient $\alpha_i \in [0, 1]$
- *M* is the number of free courses finished, with a gain following a function on the duration of the course, $f(d_i)$
- $\beta_i \in [0, 0.5]$ is the proportion of STUT tokens traded to TUT tokens, both in free and paid courses.
- *H* is the set of skills known by the student
- ω_0 is the position of the student within the ordered array of relevance, measured with the total number of STUT tokens, and ω_{0h} is the position of the student within the ordered array of relevance for the skill *h*.
- *E* is the number of third-party entities searching for candidates to fill a job vacancy, each one contributing T_{ih} TUT tokens to get n_i candidates in a skill *h* known by the student.
- B_h is the fund contributed by Tutellus for the skill *h*, to distribute between the A_h students knowing this skill.

The student will get a total relevance (STUT) of

$$S_1 = S_0 + G(STUT)$$

In addition, for every skill *h* known, the student will earn the STUT associated with the skill, following the same formula, yet only counting the STUT coming from courses associated with that skill, with the *H* set that determines the relevance of the student in every skill becoming *H'*:

$$H' = [s_{11}, s_{21}, s_{31}..., s_{H1}] = [s_{10} + G_1(STUT), s_{20} + G_2(STUT), s_{30} + G_3(STUT)..., s_{H0} + G_{H'}(STUT)]$$

Which will give us a new position of the student inside the global STUT array ω_1, as well as new values for the STUT array for every skill, $P_1 = [\omega_{11}, \omega_{21}, \omega_{31}..., \omega_{H'1}]$, with the possibility of adding new skills to the array.

Let's have a deeper look at the four terms adding to the students' income.

The first term in the TUT income comes from the paid courses and is always negative, with a maximum of

$$Max(I(TUT)) = -0.4 * \sum_{i=1}^{N} p_i$$

With the losses becoming earnings for teachers and the platform.

The second term are the rewards coming from the free courses. Is not expected to become a significant source of income for the student, even though the balance for the student is always positive both in relevance and income.

The third and fourth terms (companies and study grants) can become positive and significant incomes, with these terms heavily depending on the position of the student inside the relevance arrays: the global array related to the study grants and the skill specific arrays when it comes to companies and other third-parties.

As a result, the number of STUT tokens is the key to a high income in TUT tokens. Therefore, the contribution of the student to the platform is the main driver of the student income.

Any student may have two different goals in mind when entering the Tutellus community, not mutually exclusive: either gaining relevance in some specific skills (STUT, perhaps to help find a job), or earning a direct income (TUT). The first goal quite obviously contributes to the addition of educational value to the platform, but the second, once analyzed, does the very same. If the student is getting high rewards, it is because the contributions to the platform in terms of effort and dedication have been high as well.

In this way, the key to the student's personal gain is always the community's gain, with the result being a community working together for the benefit of all parties involved.

II.3. Gain Model for Teachers

Teachers are the core element of any educational community. Consequently, they take part in the token flow and are rewarded for their efforts, both in income tokens (TUT) and in relevance (STUT).

The distinct feature Tutellus gives to its teachers is the possibility of gaining direct rewards as a result of the excellence of their students. The contribution of educational value from the students who learn from a given teacher may become a noticeable income for the teacher, with the goal of giving all teachers an added motivation to encourage the best from their students.

Just like in the case of the students, the relevance of a teacher inside the platform is quantified by a number of STUT tokens SP_0. These tokens are also associated to specific skills, with any teacher having associated an array of STUT $[sp_{10}, sp_{20}, sp_{30}..., sp_{H0}]$ in a number *h* of skills. If the teacher is also a student in the platform, which is usually the case, the STUT generated as a student are stored in a different array in order to avoid unfair comparisons between students and teachers of a given skill when it comes to the distribution of shares.

Let's call ωp_0 the position held by the teacher at the beginning of the period in the global array of STUT, and ωp_{h0} the position in the STUT array associated with the skill *h*. The STUT array is thus associated with a positional array *PP* that gives us the relevance of a teacher as compared with other teachers in every skill:

$$PP_0 = [\omega p_{10}, \omega p_{20}, \omega p_{30}..., \omega p_{H0}]$$

There are four different sources from which a teacher can earn STUT and TUT:

I. Sales of paid courses
II. Income from subscription services
III. Income from third-party entities
IV. Activity as a teacher of a course

The sum of these four sources—which can be TUT, STUT, or both—represents the total income.

II.3.1. Sales of Paid Courses

During a certain period a teacher sells a number *N* of courses, each one with a price p_i, retaining a percentage σ_i between 75% and 85% depending on the type of sale.

$$I(TUT) = \sum_{i=1}^{N} p_i \sigma_i;\ \sigma_i \in [0.7, 0.85]$$

II.3.2. Income from Subscription Services

One of the most popular products offered by Tutellus is the subscription service, by which the student gets the right to access as many courses they want for a specific period of time. Teachers get their share of the subscription fee depending on the total amount of time spent by the students in their specific courses.

Let *M* be the number of courses the teacher is getting an income from. For every course there is a number of students u_i, who have paid a fee c_i for the subscription during this period of time and who have spent some time t_i on the course. Over this value, let's also apply the teacher's share σ_i.

$$\sum_{i=1}^{M} u_i c_i t_i \sigma_i;\ \sigma_i \in [0.7, 0.85]$$

Currently there are three types of subscription services: monthly, quarterly, and yearly. The subscription price is calculated from the subscription payment *U*, divided by the number of times the income is calculated. If *W* is the number of times per month, the fee is

$$c = \frac{U}{W\rho};\ \rho \in \{1, 3, 12\}$$

Which gives us

$$II(TUT) = \sum_{i=1}^{M} u_i \frac{U_i}{W\rho_i} t_i \sigma_i;\ \sigma_i \in [0.7, 0.85], \rho_i \in \{1, 3, 12\}$$

II.3.3. Income from Companies and Third-Parties

During a specific period a number *E* of companies and third-parties searching for candidates with high levels of relevance in specific skills contribute a number of TUT tokens associated with such skills. A fraction of this income is distributed among the teachers associated with these students. A student is associated with a teacher in a skill if the student successfully finished one or more courses associated to the skill and was taught by that teacher.

For every skill *h* they are interested in, the companies and other third-parties contribute a number of TUT tokens $[T_{1h}, T_{2h}, T_{3h}..., T_{Nh}]$ while in search of the best n_i students. For every student associated to a certain teacher, the teacher will receive an income to be distributed according to a Zipf distribution related to to the relevance of the teacher..

If the STUT array of the teacher, by skills, is $[s_{10}, s_{20}, s_{30}..., s_{H0}]$, then we have an array of positions of the teacher relative to the rest of the teachers of each specific skill $[\omega p_{10}, \omega p_{20}, \omega p_{30}..., \omega p_{H0}]$, which will then determine the income.

Let's name *K* the number of students associated to the teacher that have been selected. For every one of them the teacher gets a share p_k of the 20% of the total income divided by the number of students searched.

$$\sum_{i=1}^{E}\sum_{h=1}^{H} p_h \frac{0.2*T_{ih}}{n_i}$$

The proportion depends on the position of the teacher in the STUT array ωp_{h0}, determined by a Zipf distribution as detailed in earlier sections.

$$p_h = \frac{1}{\omega p_{h0}*[LnT_h+0.5772+1/2T_h]}$$

Where T_h is the number of teachers with courses associated to the skill *h*. Adding all *K* students we have incomes for every E_k company and other third-party and H_k skill.

$$\sum_{k=1}^{K}\sum_{i=1}^{E_k}\sum_{h=1}^{H_k} p_h \frac{0.2*T_{ih}}{n_i}$$

Which finally gives us:

$$III(TUT) = \sum_{k=1}^{K}\sum_{i=1}^{E_k}\sum_{h=1}^{H_k} \frac{0.2*T_{ih}}{\omega p_{h0}*[LnT_h+0.5772+1/2T_h]*n_i}$$

II.3.4. Activity as a Teacher in the Courses

Just like the students, the teacher gets TUT and STUT tokens for additional educational contributions in the courses.

If the course is a paid course, the teacher gets a share α_i of the price p_i in STUT tokens, up to 50% of which can be traded to TUT tokens. For *NP* paid courses evaluated during a certain period we get:

$$IV(STUT)_1 = \sum_{i=1}^{NP} p_i \alpha_i.(1-\beta_i); \alpha_i \in [0,1],\ \beta_i \in [0,0.5]$$

$$IV(TUT)_1 = \sum_{i=1}^{NP} p_i \alpha_i \beta_i; \alpha_i \in [0,1],\ \beta_i \in [0,0.5]$$

If the course is free, the number of STUT tokens is correlated to the course duration d_i via an increasing step function $f(d_i)$. As in the case of the paid courses, up to half of the STUT tokens earned can be traded to TUT.

If the number of free courses evaluated during the period is MP with a duration of d_j, after trading a part β_j' to TUT tokens, we have:

$$IV(STUT)_2 = \sum_{j=1}^{MP} f(d_j).(1-\beta_j'); \beta_j' \in [0, 0.5]$$

$$IV(TUT)_2 = \sum_{j=1}^{MP} f(d_j).\beta_j'; \beta_j' \in [0, 0.5]$$

With a total number of TUT and STUT tokens of:

$$IV(STUT) = \sum_{i=1}^{NP} p_i \alpha_i.(1-\beta_i) + \sum_{j=1}^{MP} f(d_j).(1-\beta_j')$$

$$IV(TUT) = \sum_{i=1}^{NP} p_i \alpha_i \beta_i + \sum_{j=1}^{MP} f(d_j).\beta_j'$$

$$\alpha_i \in [0, 1],\ \beta_i \in [0, 0.5],\ \beta_j' \in [0, 0.5]$$

II.3.5. Conclusions

Combining all possible sources of teacher income, the total benefit is:

Income (TUT):

$$G(TUT) = I(TUT) + II(TUT) + III(TUT) + IV(TUT)$$

$$G(TUT) = \sum_{i=1}^{N} p_i \sigma_i + \sum_{i=1}^{M} u_i \frac{U_i}{W \rho_i} t_i \sigma_i + \sum_{k=1}^{K} \sum_{i=1}^{E_k} \sum_{h=1}^{H_k} \frac{0.2 * T_{ih}}{\omega p_{h0} * [LnT_h + 0.5772 + 1/2T_h] * n_i} + \\ + \sum_{i=1}^{NP} p_i \alpha_i.(1-\beta_i) + \sum_{j=1}^{MP} f(d_j).(1-\beta_j')$$

Relevance (STUT):

$$G(STUT) = I(STUT) + II(STUT) + III(STUT) + IV(STUT) = 0 + IV(STUT)$$

$$G(STUT) = \sum_{i=1}^{NP} p_i \alpha_i \beta_i + \sum_{j=1}^{MP} f(d_j).\beta_j'$$

Where:

- *N* is the number of paid courses sold, each at a price of p_i, with a profit percentage $\sigma_i \in [0.7, 0.85]$ depending on the type of sale.
- *M* is the number of paid courses u_i that students follow through a subscription service with a type $\rho_i \in \{1, 3, 12\}$, having paid a total amount of U_i for the service. There are *W* evaluations per month, and the time a student has dedicated to the course is t_i.
- *H* is the set of skills of each teacher, with T_h the number of teachers with the skill *h.*
- ωp_0 is the position of the teacher in an ordered array of relevance, given by the number of STUT tokens, and ωp_{0h} is the position of the teacher in the ordered array associated with the skill *h*.
- *E* is the number of companies and third-parties in search of potential candidates for a job offer, each one contributing T_{ih} to get access to n_i candidates with the skill *h*.
- *K* is the number of students selected by these entities E_k in the skills H_k and associated to the teacher.
- *NP* is the number of paid courses taught by the teacher that have been evaluated during the period at a price p_i, where the extra educational effort by the teacher has been quantified as $\alpha_i \in [0, 1]$
- *MP* is the number of free courses taught by the teacher that have been evaluated during the period, with an income depending on the duration of the courses following a function $f(d_i)$
- $\beta_i, \beta_j^{'} \in [0, 0.5]$ are the percentages of STUT tokens traded to TUT tokens in both paid and free courses.

The two first terms of the sum represent the traditional gain for the teacher in a traditional educational platform, with the third and fourth terms only being found in the Tutellus platform.

The fourth term determines the relevance of the teacher in the skills taught, giving a small benefit to the teacher and also being essential in the determination of the third term.

It is in the third term that the teacher is rewarded for both their own significant contributions as well as those of their associated students. This occurs in two ways. First, the relevance of teachers in a given skill determines the share they receive of the incomes coming from the companies and other third-parties. Second, since the quality of the courses determines in part the selection of the students, teachers earn an additional income every time one of their students is selected.

By doing this we encourage the commitment of teachers both within the community as a whole and within their own courses, thus forming a direct relationship between the educational efforts of the teachers and the income they receive.

II.4. Balance inside the STUT Pool

STUT tokens quantify the relevance of users, both students and teachers, by measuring the educational value given to the platform. Users draw STUT tokens from a pool maintained by Tutellus.

At the beginning, the pool will be ten times the size of the TUT pool. 10% of this pool will be distributed between the users according to their activity within the platform to date, which gives them an initial value for their relevance measured by their level of STUT.

From that point forward, the activities of both students and teachers earn them STUT tokens that come from this pool. From time to time, the state of the pool will be evaluated, with the long-term goal being to keep about 30% of all existing STUT tokens inside the pool.

II.4.1. Variation Due to User Activity

Let P_0 denote the proportion of STUT tokens in the pool at the beginning of a period, with a total number of *S* STUT tokens in the system as a whole. Throughout this period, a number of users *N* gets n_i of STUT tokens each, trading up to 50% β_i to TUT tokens. The amount of STUT lost is:

$$\sum_{n=1}^{N} n_i(1-\beta_i); \beta_i \in [0, 0.5]$$

The pool then moves to a new proportion

$$P_1 = \frac{P_0 S - \sum_{n=1}^{N} n_i(1-\beta_i)}{S} = P_0 - \frac{\sum_{n=1}^{N} n_i(1-\beta_i)}{S}$$

Let's call ΔP to the increase in this percentage.

$$\Delta P = -\frac{\sum_{n=1}^{N} n_i(1-\beta_i)}{S}$$
$$P_1 = P_0 + \Delta P$$

The total number of STUT tokens in the pool is $P_1 S$, and the increase of STUT tokens in the pool is $\Delta P S$.

II.4.2. Restoring the STUT Pool

If P_1 gets below 70%, the pool is adjusted through two mechanisms: tokens are taken back from students who have been inactive for a long time and new STUT tokens are created. The restoration of the pool is complete if the value of the P_1 percentage has gone below 30%, and between 30% and 70% a part λ of the percentage is restored, with λ given by a generalized logistic function inverted in the OY axis and with an inflection point of 0.5.

$$\lambda = \frac{1}{1+e^{K(-P_1+0.5)}}$$

The growth rate of the function, *K*, will be regularly updated after the real behavior of the platform is tested, with an initial value of 20.

By using this function the system will make conservative decisions close to 70% and more extreme decisions close to 30%, with a 50% of STUT tokens recovered if the new P_1 percentage is 50%. For *K=20*, the system recovers 2% of STUT tokens at 70% and 98% of STUT tokens at 30%. If $P_1 < 30\%$, then λ is considered to be 1. If $P_1 > 70\%$, then λ is considered to be 0.

The tokens added to the pool may come from two sources, either from inside the system, having been taken from inactive users, or having been created from scratch. If we call γ the proportion of STUT tokens coming from within the system, the STUT tokens added can be written as:

$$\lambda \Delta PS = \gamma \lambda \Delta PS + (1-\gamma)\ \lambda \Delta PS\ = R + \Delta S$$

Where *R* are the STUT tokens taken from the users and ΔS is the amount of new STUT tokens created and added to the system.

II.4.3. STUT Tokens Taken from the Users

The value for γ is determined by the number of STUT tokens taken back from inactive users. A user is considered an inactive user if a given amount of time has passed without any interaction with the system. This threshold will be determined by a study of the churn rate of the platform and will represent the period of time needed to assure, with 95% confidence, that a user will not return. Currently, this value is estimated to be 15 weeks, or 105 days. Further churn analyses will potentially modify this period of value.

From the inactive users we take a proportion p_i of STUT tokens, depending on the amount of linear time that the users have been inactive t_i, starting with 5% when the value of *t* is reached and never going over 20% of a user's STUT in a single period, a value reached at five times the value of *t*. A user with s_i STUT who has been inactive for a time $t_i > t$ suffers the following loss of STUT

$$min[0.2,\ 0.0125(3\tfrac{t_i}{t}\ + 1)] * s_i$$

For M inactive users, the amount of taken STUT tokens is

$$\sum_{i=1}^{M} min[0.2,\ 0.0125(3\tfrac{t_i}{t}\ + 1)] * s_i$$

Which is the value of R in the equation that gives us the number of STUT given to the pool.

$$R = \gamma \lambda \Delta PS = \sum_{i=1}^{M} min[0.2,\ 0.0125(3\tfrac{t_i}{t}\ + 1)] * s_i$$

With a final value for γ expressed as

$$\gamma = \frac{\sum_{i=1}^{M} min[0.2,\ 0.0125(3\frac{t_i}{t} + 1)] * s_i}{\lambda \Delta PS}$$

Which is used to determine the number of new STUT tokens to be created.

II.4.4. Creation of New STUT Tokens

The amount of new STUT tokens created comes from the equation that gives us the amount of STUT tokens added to the pool as

$$\Delta S = (1-\gamma)\ \lambda \Delta PS$$

Where γ is calculated as seen in the previous section:

$$\Delta S = (1 - \frac{\sum_{i=1}^{M} min[0.2, 0.0125(3\frac{t_i}{t}+1)]*s_i}{\lambda \Delta P S}) * \lambda \Delta P S$$

$$\Delta S = \lambda \Delta P S - \sum_{i=1}^{M} min[0.2,\ 0.0125(3\frac{t_i}{t}+1)]* s_i$$

Where:

- λ is the percentage of the loss of STUT tokens in the pool to be recovered: 0 if the loss has left over 70% of the STUT tokens in the pool, 1 if the pool falls below 30%, and a number in between in any other case.
- ΔP is the increase of the percentage of STUT tokens in the pool during the period.
- *S* is the total number of STUT tokens in the system.
- *M* is the number of inactive users, with a user being considered inactive if a certain period of time has passed without interacting with the system, t_i, bigger than a given t, whose value is determined through the churn rate of the platform. Each of these users has an amount s_i of STUT tokens.

These new STUT tokens created allow us to update the total number of STUT tokens in the system

$$S_1 = S_0 + \Delta S$$

Which will be used to determine the percentages for the next period.

By using economic metrics to issue new tokens, we can make objective decisions, thus conditioning the creation of new tokens and the following inflation to the health of the platform itself.

An increase in the activity and value of the platform and a high retention of the most valuable students and teachers in the system will give us a low value for γ, with many valuable contributions to the community. This will create a high level of demand in the system, with the relevance earned by the users keeping its absolute value but being worth less when considering the total number of users. As a result, the level of excellence needed to be relevant in the system will increase, with more effort and value needed due to the demand in the token quantifying it.

On the other hand, a decrease in activity and a high level of abandonment among the users will give us high levels for γ, lowering the amount of new tokens issued and rewarding those users loyal to us by stabilizing their positions in the STUT array.

II.5. Initial Distribution of STUT Tokens

The initial issue of STUT tokens is ten times the number of TUT tokens issued. 10% of these STUT tokens will be distributed among the students and teachers within Tutellus, currently numbering nearly a million users.

This distribution will be done according to the educational value contributed by the user to date, as measured by the activity in the system. Each user in Tutellus has a value of activity, measured by a system implemented over two years ago, to measure the educational effort. To date, this activity metric has been used to identify the most valuable users of the platform, and it is now possible to reward these value-bringing users thanks to the monetization of the platform.

This activity metric lacks the level of detail of the STUT token. Each user is associated in our database to a set *k* of skills, either by expressing interest in the topic, or by getting products, free or paid, associated with the skill. User relevance in the system is currently measured by the activity metric, which is not segmented by skills, but rather is a constant along the array of skills

$$[a_1, a_2, a_3 ... a_K]$$

We obtain a position in the array of activities associated with the skills, for every student and every skill which allows us to compare between students.

$$[\omega_1, \omega_2, \omega_3 ... \omega_K]$$

Let *B* be the initial number of STUT tokens to be distributed to current users. For every skill *h* in the platform, we count the users that have either tagged the skill as an interest, or have shown interest in the skill by finishing a course associated with it. Thus we get an array of number of students by skill

$$[n_1, n_2, n_3 ... n_H]$$

Where the sum of these values is greater than or equal to the total number of users, since each user can have multiple skills. The share of STUT tokens among these skills follows a proportional distribution, so the amount given to the skill *h*, b_h, is

$$b_h = \frac{Bn_h}{\sum_{i=1}^{H} n_i}$$

This amount is distributed among the n_i users associated with the skill, again following Zipf's law, thus rewarding in a significant way the biggest contributions while making sure every contribution has, in some way, been rewarded. For this process we use the position of the user ω_k inside the relevance array, with the total amount of STUT tokens per user and skill being expressed as

$$G(STUT)_k = \frac{Bn_k}{\sum_{i=1}^{H} n_i * \omega_k * [LnA_k + 0.5772 + 1/2A_k]}$$

Where A_k is the number of students with activity greater than zero in the skill. The total amount given to the user in the initial share of STUT tokens is then

$$G(STUT) = \sum_{k=1}^{K} G(STUT)_k = \sum_{k=1}^{K} \frac{Bn_k}{\sum_{i=1}^{H} n_i * \omega_k * [LnA_k + 0.5772 + 1/2A_k]}$$

With an initial array of STUT for the *K* skills

$$[G(STUT)_1, G(STUT)_2, G(STUT)_3, ..., G(STUT)_K]$$

Which provides us with the values used to quantify a user's initial relevance in the system.

Tutellus

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