Computer Programs and Licensing Needs for AI: is EU Copyright law fit?
人工智能计算机程序及其许可需求：欧盟当前的版权法是否合适?

4th EU-China IP Academic Forum
第四届欧盟-中国知识产权学术论坛

Computer Programs and Licensing Needs for AI
人工智能计算机程序及其许可需求
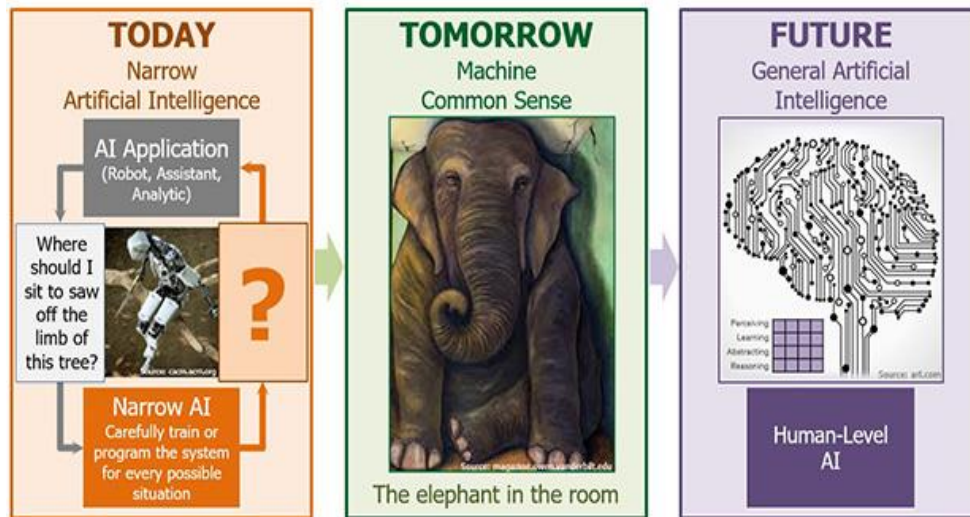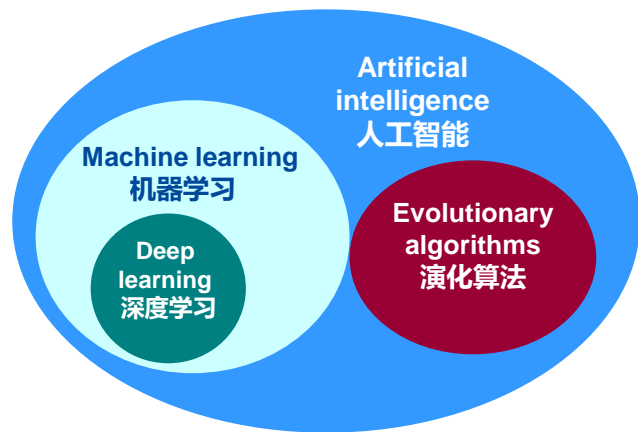
Goal: Initial "legal fitness" assessment
目标： "法律合适性"初步评估

1. Introducing the subject: AI; ML or DNN?
2. 主体介绍：人工智能；机器学习或深度神经网络?
3. Computer Programs 计算机程序
   - © protection framework 版权保护框架
   - Does software as a technology break important underlying © assumptions? 软件技术是否可以打破重要的基础版权假设?
   - Is EU © law fit for "AI computer programs"? 欧盟当前的版权法是否适合人工智能计算机程序?
4. Licensing scheme 许可方案
   - Current framework 当前框架
   - Are licensing needs for "the subject" fulfilled? 人工智能计算机程序的许可需求是否得到满足?

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1. Introducing the subject: Machine Learning?
1. 主体介绍：机器学习?

Training algorithm

Model architecture

Model

Modification of parameters

Training data sets

New data

Prediction

Application

Works 作品
Performances 表现
Recordings 记录
Works in the PD, etc 公共领域的作品等.

Datasets
数据集

Digital / digitized 数字/数字化
Open / TPM & DRM 开放/技术保护措施与数字权利管理

Software by © 按版权区分的软件
Functional algorithms (TS) 函数式算法(TS)

Input
输入

Processing
处理

Output
输出

Direct outputs (prediction) 直接输出（预测）
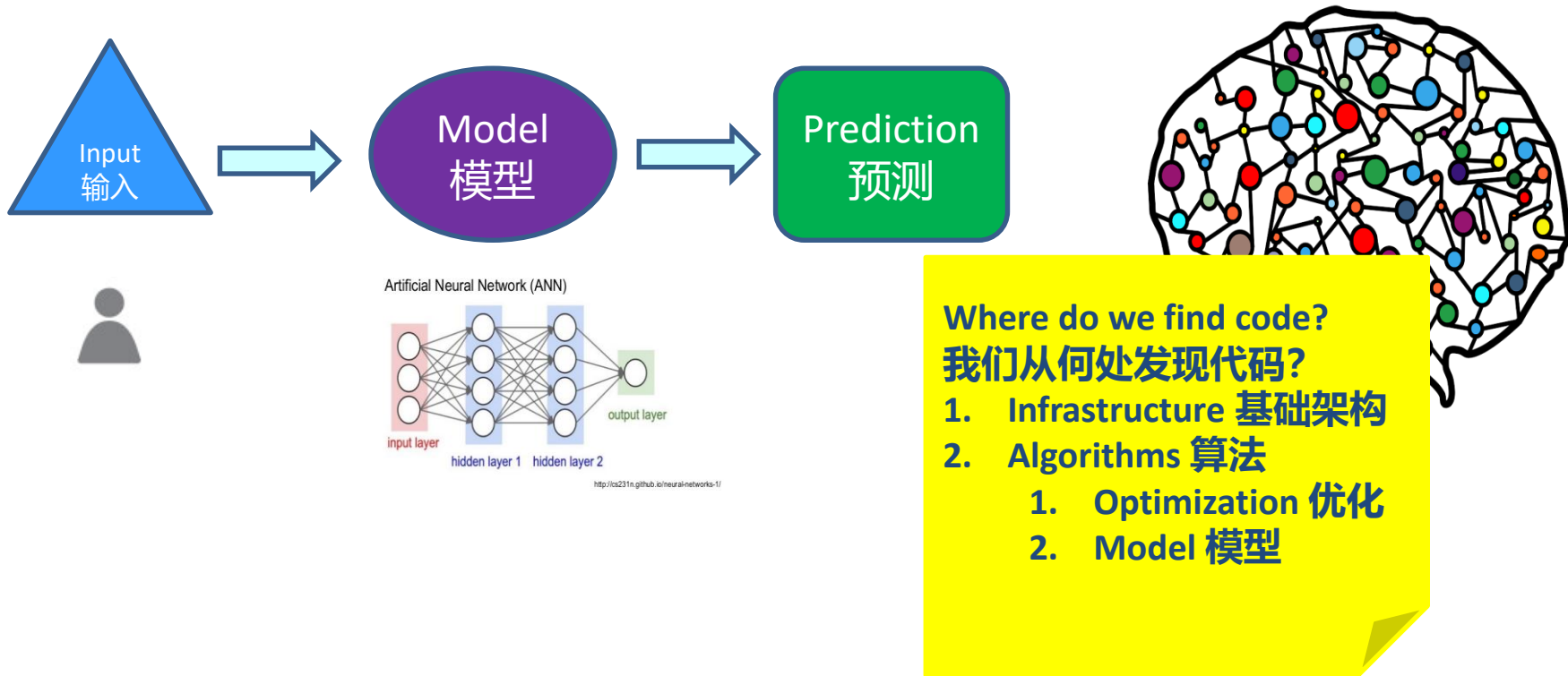Applications (human input) 应用（人类输入）

RG on the Regulation of the Digital Economy: *Technical Aspects of AI: An Understanding from an IP Law Perspective, V. 1.0, October 2019.*
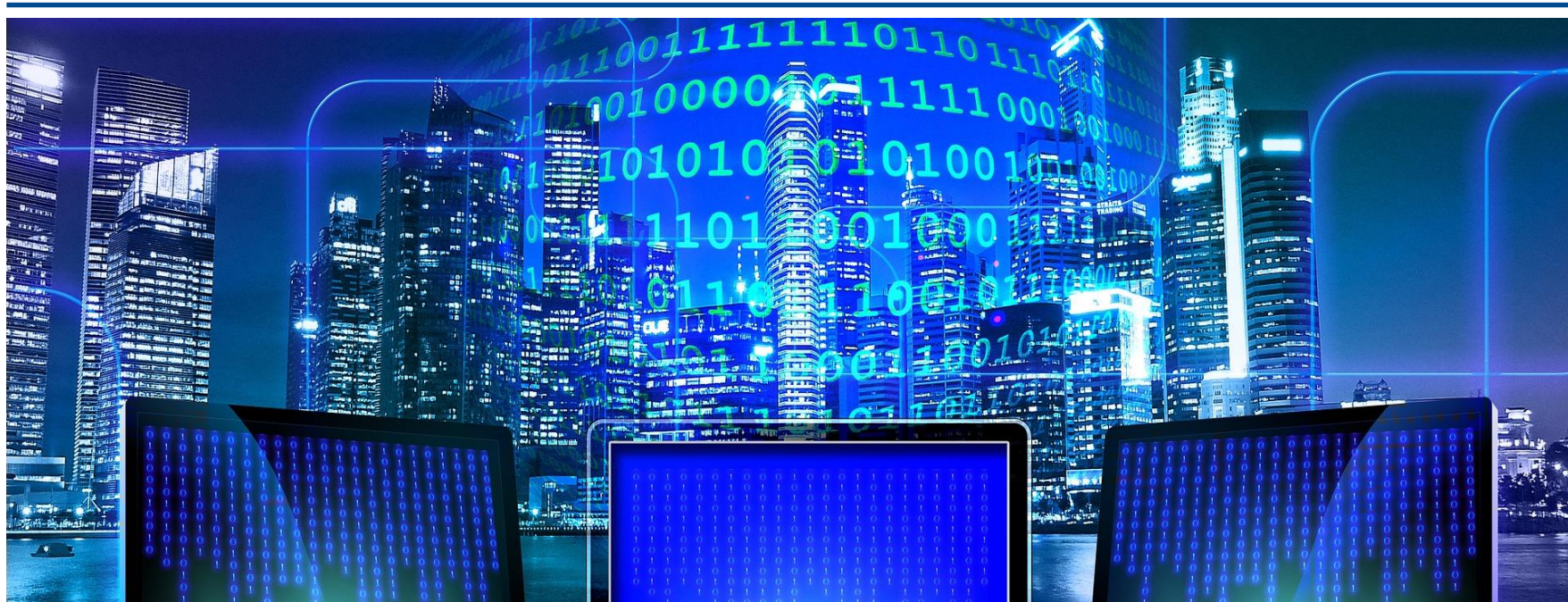*数字经济规范研究小组：从知识产权法角度对人工智能技术方面的理解，1.0版，2019年10月*

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1. Introducing the subject: Deep Neural Networks?
1. 主体介绍：深度神经网络?

Input
输入

Model
模型

Prediction
预测

Artificial Neural Network (ANN)

input layer
hidden layer 1 hidden layer 2
output layer

http://cs231n.github.io/neural-networks-1/

Where do we find code?
我们从何处发现代码?
1. Infrastructure 基础架构
2. Algorithms 算法
   1. Optimization 优化
   2. Model 模型

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2. Computer Programs 计算机程序

Pixabay databank   Pixabay 数据银行

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Computer Programs in the CPD: Theory 《计算机程序法律保护指令》中的计算机程序：理论

Subject matter and scope: Art. 1 CPD and Rec. 7, 11 主旨与范围：《计算机程序法律保护指令》第1条以及引言第7和第11条

1.1 CPD: "as literary works" per the Berne Convention (**but**, computers are also **engineered devices**: they **behave**)
1.1 **《计算机程序法律保护指令》**：按照《伯尼尔公约》属于"**文字作品**"（**但是**计算机也是**工程化设备**，能够产生**行为**）
1.2 CPD: protection shall apply to the **expression** in any form. Ideas and principles underlying, including those of interfaces, are not protected under the CPD.
1.2 **《计算机程序法律保护指令》**：保护**应**适用于任何形式的**表达**。基础思想和原则（包括界面的基础思想和原则）不受《计算机程序法律保护指令》的保护。

Rec. 7: programs **in any form**, including those incorporated to hardware + **preparatory design work**
引言第7条：**任何形式**的程序，包括置入硬件的程序以及**前期设计工作**
Rec. 11: (Idea/expression dichotomy) – to the extent that **logic, algorithms and programming languages** comprise ideas and principles: no copyright protection. But, the expression of those ideas and principles is to be protected by copyright.
引言第11条：（思想/表达二分法）——在**逻辑、算法和编程语言**所构成思想和原则的**范围内**：无版权保护。但是，上述思想和原则的表达，受到版权的保护。

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Computer Programs in the CPD: In practice 《计算机程序法律保护指令》中的计算机程序：实践

What is a computer program? Any legal definition of computer program? ☹

什么是计算机程序？计算机程序是否有法律定义？

Computer program is an umbrella term: heterogeneous and **composed** of several different **elements** varying on the **type** of software (firmware, embedded, OS) and its **functionality**.

计算机程序是一种涵盖性术语：意义繁多，由几种不同的要素**组成**，这些**要素**随着软件**类型**（如固件、内置、操作系统）及其**功能**的不同而发生变化。

Which elements? Source code, object code, data flows, algorithms, programming language, interfaces, …

哪些要素？源代码、目标代码、数据流、算法、编程语言、界面......

The development of software protection under EU copyright has evolved through different stages of assessing the LIMITS of protection of ITS ELEMENTS (C-393/09, BSA on GUI; C-406/10, SAS Institute on programming language and format of data files)

So… for instance…ALGORITHMS? Depends on the understanding of the term:

就评估软件要素的保护限度而言，欧盟版权法对软件的保护经历了不同的阶段（C-393/09，软件联盟关于用户图形界面的工作；C-406/10, SAS软件研究所关于编程语言和数据文件格式的工作）

所以，举个例子，什么是算法？取决于对这一术语的理解：

- If as an **abstract idea** = No © - But can algorithms be abstract ideas??
- **如果将其看做一种抽象思想=无版权——但是算法可能是抽象思想吗？**
- If as the **expression of an idea** = Yes ©
- **如果将其看做思想的表达=有版权**

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2.1. Protection of computer programs under EU copyright law
2.1 欧盟版权法对计算机程序的保护

Computer Programs in the CPD: In practice 《计算机程序法律保护指令》中的计算机程序：实践

Subject matter and scope (cont.) 主旨与范围（续）

There is an apparent tension between the protection of software under copyright and the nature of software itself

版权法对软件的保护与软件自身的性质之间存在明显分歧

- CJEU has applied copyright protection in a narrow way
- 欧盟法院对版权保护的应用范围较为狭义
    - **CJEU C-406/10** (Par. 40): functionality can not be protected under copyright as it would amount to making it possible to monopolize ideas, to the detriment of technological progress and industrial development.
    - **欧盟法院406-10号案件**（第40段）：版权不能保护功能性，因为这有可能导致思想垄断，危害技术进步与行业发展。

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Initial diagnosis: Looks fit, however… 初步诊断：看起来合适，然而…

Does software as a technology break important underlying © assumptions? (Not a new question) Yes: "Software is a machine whose medium of construction happens to be text"

软件技术是否会打破重要的底层版权假设？ （这并非新问题）是的： "软件是一种机器，只是其构造介质恰好是文本"

Act of creation? (Not a new question) Does the training of an optimization algorithm / a model fulfil the requirement of the trainer's own intellectual creation?: Originality threshold is low and there are not autonomous algorithms / models: Yes

创造行为？ （这也并非新问题）训练一种最优算法/一种模型是否能满足训练者自身智力创造的要求？： 原创性门槛较低，不存在自主算法/模型： 是

1. But, **what do we want to protect against?**
    但是，**我们想要防止的是什么？**

2. Any decision about IP protection is also a decision about the grounds for competition:
   有关知识产权保护的任何决定也是有关竞争理由的决定：
    1. Narrow protection = more latitude for innovation of functional equivalent programs – clones, competition based on factors like price, quality of implementation, user support, etc.
        狭义保护=对功能等效型程序的创新有更多选择——可以克隆，可以基于价格、实施质量、用户支持服务等开展竞争。
    2. Broad protection = increased emphasis on innovative functionality in second comers.
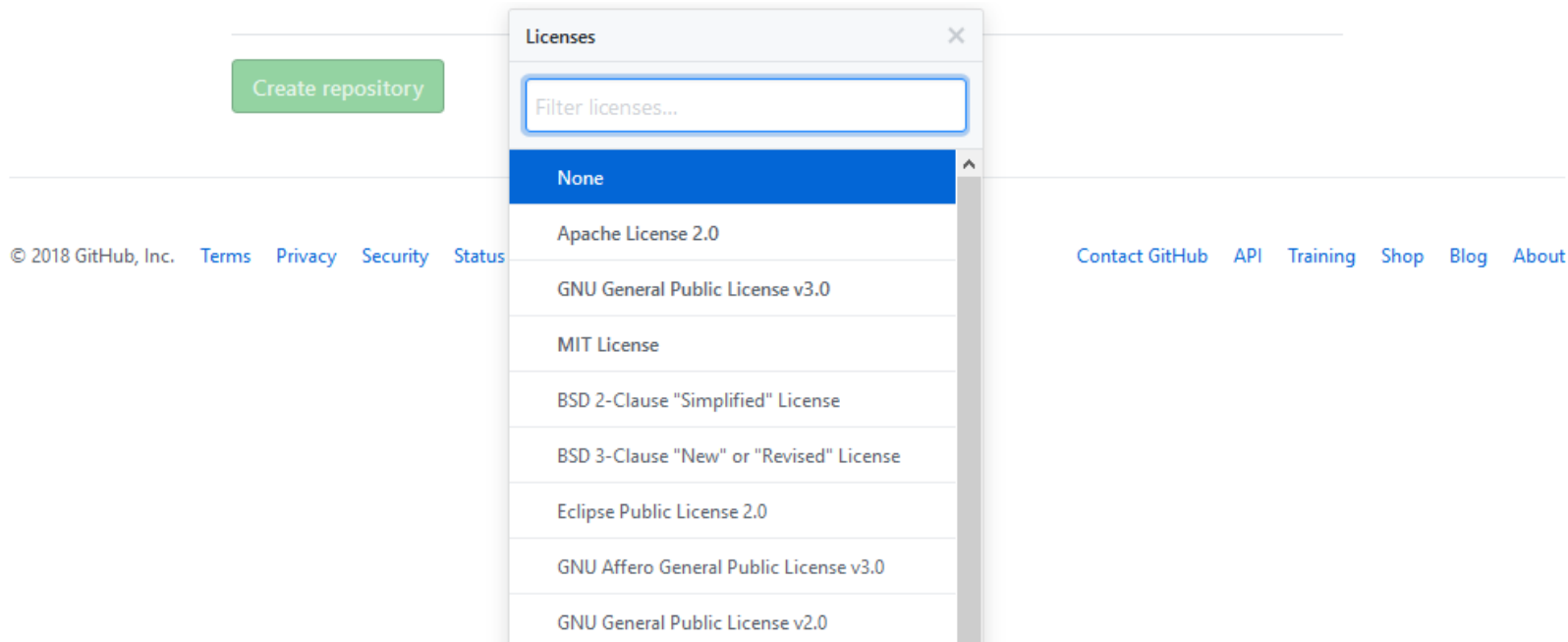   广义保护=更强调后来者所体现的创造性功能

3. Careful with investment protection rationale for a "new" sui generis right: what do we want to accomplish with the law??
   需谨慎对待为获取 "新" 特殊权利而提出的保护理由：我们想通过这部法律达到什么样的目的？

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4. Licensing 许可

GitHub menu   GitHub菜单

4.1. Current framework: E&L 当前框架：例外与限制

Computer Programs in the CPD 《计算机程序法律保护指令》中的计算机程序

Exceptions & Limitations: Arts. 5, 6 CPD (no contracted out) – A lawful user can 例外与限制：《计算机程序法律保护指令》第5条和第6条（合同未禁止）——合法用户可以开展的活动
Load, run necessary for use (Rec. 13) 为使用而上传、运行计算机程序（引言第13条）
Errors correction (Rec. 13) 纠错（引言第13条）
Back-up copy 备份拷贝
Reverse-engineering 反向工程
Decompilation for interoperability with a new independent program 为与一套独立开发的新程序互操作而进行反编译

TPMs: Art. 7.1.c) CPD 技术保护措施：《计算机程序法律保护指令》第7.1c)条
Without prejudice of arts. 4, 5 & 6, MEs shall provide (…) remedies against (…): c) Any act of putting into circulation, or the possession for commercial purposes of, any means the sole intended purpose of which is to facilitate the unauthorized removal or circumvention of any technical device which may have been applied to protect a computer program
在不影响第4、第5和第6条的前提下，成员国应针对（…）规定（…）补救措施：**c)** 出于商业目的的传播或者占有某种方法，而该方法的唯一预期目的是便于对旨在保护计算机程序的任何技术设备进行未被授权的移除或规避

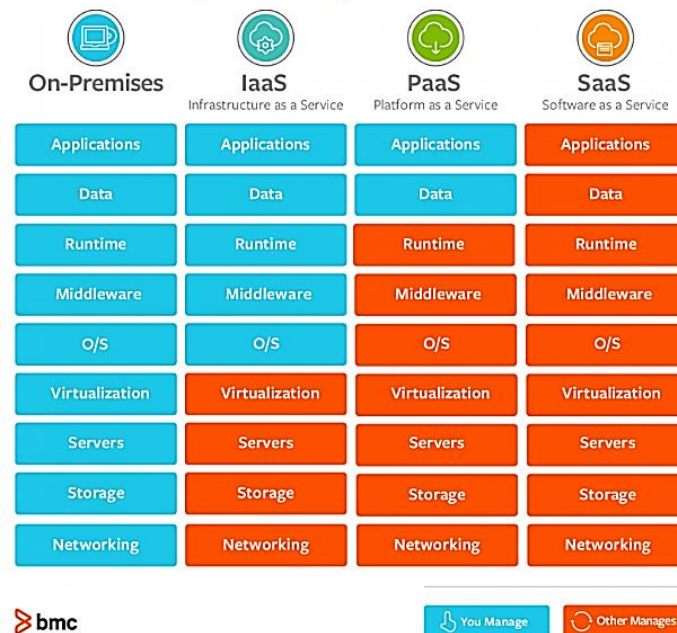**Crossing point TPMs / E&Ls?** Arts 5 & 6 CPD **技术保护措施/例外与限制之间的交叉点?** 《计算机程序法律保护指令》第5和第6条

4.1. Current framework: Licensing 当前框架：许可

- Types of "traditional" software licensing: "传统"软件许可的类型
  - FSL (Free) **自由**软件许可
  - OSL (Open source) **开源**许可
  - PSL (Proprietary) **专有**软件许可
  - HSL (Hybrid) **混合**软件许可
- Types of cloud "service" software licensing: 云"服务"软件许可的类型
  - IaaS (Infrastructure as a service) 基础架构即服务
  - PaaS (Platform as a Service) 平台即服务
  - (SaaS) Software as a service 软件即服务

OS collaboration depends upon an explicit IP regime (© & patent) codified in a series of licenses. 开源合作需要通过一系列许可证进行规范的明确知识产权机制（版权与专利）

Summary of Key Differences

On-Premises	IaaS Infrastructure as a Service	PaaS Platform as a Service	SaaS Software as a Service
Applications	Applications	Applications	Applications
Data	Data	Data	Data
Runtime	Runtime	Runtime	Runtime
Middleware	Middleware	Middleware	Middleware
O/S	O/S	O/S	O/S
Virtualization	Virtualization	Virtualization	Virtualization
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking

bmc   You Manage   Other Manages

4.1. Licensing needs for AI: Software 人工智能的许可需求：软件

- Free software licensing (GPL) prohibits the use of TPM but 自由软件许可（通用公共许可证）禁止使用技术保护措施，但有
  - Copyleft "著佐权"

- Legal nature: 法律性质：
  - BE: analogy to rental contracts; GR: unilateral instruments (exploitation licenses); DE, ES: contracts
  - 比利时：类似于租赁合同；希腊：单方面文书（实施许可证）；丹麦、西班牙：合约
  - **Legal nature impacts on legal regime, validity, enforcement, etc.**
  - **法律性质对法律机制、有效性、执行等的影响**

- EU recommends EUPL (open source, no copyleft, consistent with EU law and copyright law of the 28 EU MS + retaining compatibility with FOSS licenses), however…

- 欧盟推荐EUPL（开源、无著佐权、与欧盟法律以及28个欧盟成员国的版权法一致、保留与自由及开源软件许可证的相容性），然而...

- Most ML infrastructure software, i.e. Tensorflow: Apache 2.0 (no copyleft but RF patent + patent retaliation)

- 多数机器学习基础架构软件，如Tensorflow: Apache 2.0 （无著佐权，但有随机森林专利+专利反击）

- Uncertainty 不确定性
  - Violation of obligations of a particular OSL = termination of exclusive rights granted + © infringement could follow
  - 违反特定开源许可证的义务=终止所授予的独占权利+后续可能发生侵犯版权争议
  - Licenses compatibility
  - 许可证的相容性

Initial diagnosis 初步诊断

Are licensing needs for "the subject" fulfilled?
人工智能的许可需求是否得到满足?

- Seems to be quite an (un)balance in private ordering / copyright regime:

- 私序安排与版权制度之间似乎相当（不）平衡：

  - What do we want to protect against?

  - 我们想要防止的是什么?

  - Maybe, consider a review of E&Ls and clarification of the interface E&Ls and TPMs?

  - 也许应该考虑对例外和限制规定进行评审，并澄清例外和限制规定以及技术保护措施之间的界限?

Muchas gracias!
非常感谢！